

I declare that this thesis has been composed by me and is entirely my own work.

THE REDIVISION OF LABOUR:  
TWO FIRMS IN NINETEENTH CENTURY SOUTH EAST SCOTLAND

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ABSTRACT

With the aim of shedding light on the process of modernization in the advanced Western countries, this is a study of the origins and effects of the division of labour during industrialization. Two firms from nineteenth century South East Scotland are examined during the mechanization of their main production processes. Household census records are linked to the wage books of the firms and to the property valuation rolls in order to obtain a wide range of information on a small population of industrial workers and their families. Before mechanization, the labour process is seen to have been influenced by a pre-existing age and sexual division of labour, and workshop production is discussed in relation to structure of reward and control over work. The effect of the introduction of machines is examined in relation to the speed of abolition of jobs, the strategies of resistance, and the careers of those involved. The central theme of this thesis concerns the way in which the work process was redivided so as to create new kinds and proportions of jobs. The outcome of this redivision of labour is seen as the result of a managerial strategy aiming both to reduce costs and to achieve a real subordination of labour, conflicting with labour's own workplace and domestic organization. The result was new divisions between skilled and unskilled, mental and manual labour, and new age- and sex-specific occupations, creating a 'dual labour market' and a potential labour aristocracy. Family standard of living was found to be correlated with head's income for the high paid, and with the demographic and labour-participation characteristics of households headed by labourers. Families responded to age- and sex-specific employment patterns with

selective migration, raising local living standards for the low paid above those that were possible through the whole life cycle. It is concluded that the differentiation of advanced societies as a result of the division of labour can be seen as the product of human agency and not simply as an abstract functional imperative.



PREFACE

My first debt is to my supervisors Michael Anderson and Frank Bechhofer of the Department of Sociology, University of Edinburgh, for discussions and advice throughout the work for this thesis. I am also grateful for discussions with Bob Morris of the Economic History Department and with other researchers and students at the University of Edinburgh, including Stephen Tagg, Brenda Collins, Ian Levitt and Ben Kobashigawa. And in Philadelphia I would like to thank Lynn Lees and Maxine Berg who read earlier drafts of this thesis.

A longer standing debt is to the interdisciplinary training provided by the University of Kent at Canterbury, and in particular to Dick Scase, Krishan Kumar, Alan Armstrong, Roger Scola and Tony Skillen. The following institutions and their staff deserve mention for their help: the Social Science Research Council for a three year studentship to finance this research; the Scottish Records Office and National Register of Archives (Scotland) for their very helpful staff and easy access policy; the Registrar General's (Scotland) New Register House Library, personal thanks are due to Miss Harkness and her staff, and it is to be hoped that the value to researchers of the material held there is soon officially recognized with an access policy as good as that of the Scottish Records Office; and also the Edinburgh Regional Computing Centre's Advisory Service and Data Preparation at Alison House. Finally, I would like to thank my friends and fellow workers at the University of Edinburgh and in Philadelphia for helping me through the problems of postgraduate study. Of course, responsibility for any shortcoming or limitation in this work is entirely my own.

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## PART I: INTRODUCTION

### CHAPTER 1: ORIGINS OF THE RESEARCH

This research may be seen as part of a trend in recent sociology towards the analysis of longer periods of time and towards the development of historical studies by sociologists, the work of Anderson and Tilly<sup>1</sup> being prominent examples of this development. Such a turn towards history has come from a desire to see the origins of the advanced Western societies and to study their social change and development, much of the impetus for this coming from a sense of the inadequacy or incompleteness in the earlier sociological studies of development that appeared, after the Second World War, based on the experience of modernization in the underdeveloped or 'Third World' countries.<sup>2</sup> Such developments coincided to a considerable extent with my personal training, which was in both social history and sociology,<sup>3</sup> and this research was therefore begun with the intention of contributing to this new field of inquiry.

The specific aspect of social change chosen for study arose from an initial question which first took the following form: how was it that jobs newly created by technological change became established with status and pay levels that fitted into an existing occupational structure?<sup>4</sup> It was but a small step from this, to

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<sup>1</sup>M. Anderson, Family Structure in Nineteenth Century Lancashire (1971); C. Tilly, The Vendee (1964).

<sup>2</sup>For example, W. E. Moore, The Impact of Industry (1965); and C. Kerr et al., Industrialism and Industrial Man (1962).

<sup>3</sup>Interdisciplinary undergraduate work at the University of Kent at Canterbury consisted of a Part One in general social science, and a joint honours Part Two in sociology and economic and social history.

<sup>4</sup>This discussion took place with my first supervisor, Dr. Michael Anderson of the University of Edinburgh in December 1973.

question how the whole of the work tasks created by new technology became divided so as to separate out jobs with distinct specializations. The implications of such questions were soon seen to have many ramifications.

Most discussions of industrialization, and the British Industrial Revolution in particular, talk about the new and distinctive class structure that emerged,<sup>5</sup> yet the literature on the precise origins of new occupations is in comparison slight.<sup>6</sup> So many of the features which we identify as characteristically 'modern' in society had their origins in the division of labour since industrialization: the appearance of wage earning factory workers; the semi-skilled machinist; the supervisory foreman; the 'middle class' managers and administrators; the appearance of scientists and technicians; the non-employed housewife and the adult male 'breadwinner'; the distinction between manual and non-manual occupations. All these become more complex when they are examined in detail, yet they are all related to the new division of labour in society, and it is the object of this research to shed some light on this emergence of new occupations and class structure.

Concern with the division of labour is, of course, one of the oldest themes of sociology. This is most obvious in the work of

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<sup>5</sup>See for example, G.D.H. Cole, Studies in Class Structure (1955); A. Giddens, The Class Structure of the Advanced Societies (1973); W.E. Moore, The Impact of Industry (1965); C. Kerr et al., Industrialism and Industrial Man (1962); G.E. Lenski, Power and Privilege (1966).

<sup>6</sup>Many discussions of the changes in class and industrial structure since industrialization note the emergence of new occupations at the national and aggregate levels, e.g. J.A. Banks, Marxist Sociology in Action (1970), pp. 158-159, uses census occupational titles to show the growth in number of occupations. This should be contrasted with the study of the appearance of single or groups of related occupations.



Durkheim in his book, The Division of Labour in Society, in which he is concerned with the contrast between the mechanical solidarity of the traditional community on the one hand, the organic solidarity of associations and advanced societies on the other.<sup>7</sup> But it is also true of Marx in his concern with the workshop division of labour that produced the 'detail' labourers, 'living appendages' of the machine;<sup>8</sup> and it is true of his work in the wider sense when he considers, in the famous base-superstructure analogy, the effect of the mode of production on the rest of society.<sup>9</sup> Perhaps less obviously, but upon examination equally deeply, the work of Weber is concerned with the effects of the division of labour in his analysis of the emergence of bureaucracy and the question of authority and control in the modern enterprise.<sup>10</sup>

As has been noted, studies of developing societies have placed the notion of the division of labour at the centre of their definition of modernization. Thus, for example, Feldman and Moore in defining the 'core set of social structures' of industrialism, identify '...the factory system of production, a stratification system based on a complex and extensive division of labour and hierarchy of skills ...',<sup>11</sup>

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<sup>7</sup>See S. Lukes, Emile Durkheim: His Life and Work (1973); and A. Giddens, Capitalism and Modern Social Theory (1971), pp. 70-76.

<sup>8</sup>K. Marx, Capital, volume 1 (1976), chapter 15, p. 548.

<sup>9</sup>K. Marx, "Preface" (1859), in T.B. Bottomore and M. Rubel, Karl Marx: Selected Writings in Sociology and Social Philosophy (1963), pp. 67-69.

<sup>10</sup>See Giddens, Capitalism and Modern Social Theory (1971), pp. 154-163. See also R. Dahrendorf, Class and Class Conflict in Industrial Society (1959).

<sup>11</sup>A.S. Feldman and W.E. Moore, "Industrialization and Industrialism: Convergence and Differentiation" in Transactions of the Fifth World Congress of Sociology (1962).



Related to this has been the claim that '...the division of labour is an evolutionary universal of the human species ...',<sup>12</sup> As a consequence, the role of human agency in shaping these major changes in society has been under-emphasized, and often a form of functional determinism has been substituted, which is related to the imperatives of technology or an abstract notion of differentiation.<sup>13</sup>

In examining in detail the origins of a modern industrial occupational structure, this study will suggest that a social feature as basic as the division of labour is subject to greater variation as a result of human action than has been previously recognized. In order to demonstrate this, the idea of a total technological determinism is rejected. In discussing the role of machinery in technological change, a number of writers on technology agree that there is at least some flexibility in the social relations that can coexist with a given technology. Thus various possible divisions of labour in the same work process are recognized by Blauner and, to a lesser extent, by Merrill.<sup>14</sup> The problem of this study then becomes how it is that, following Blauner, people and machines are put together in the way that they are to produce new occupations. The scope of the possible effects of the redivision of labour is wider than that considered by

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<sup>12</sup>S.N. Eisenstadt, Social Differentiation and Stratification (1971), p. 13 (emphasis in original).

<sup>13</sup>For example, Kerr, Industrialism and Industrial Man.

<sup>14</sup>R. Blauner, Alienation and Freedom: the Factory Worker and his Industry (1964), 'Industries differ not only in technology but also in their characteristic methods of division of labour. This refers to the systematic manner in which the technical operations of men and machines are assigned to individuals as work tasks - a bundle of work tasks constituting a "job." Whereas technology sets limits on the organization of work, it does not fully determine it, since a number of different organizations of the work process may be possible in the same technological system,' p. 9. See also R.S. Merrill, "The Study of Technology" in International Encyclopedia of the Social Sciences (1968), vol. 15, pp. 576-587.

Blauner where new technology is concerned, since in such a case the limits set by the machinery also change.<sup>15</sup> A second requirement of the study of the process whereby labour is divided and new occupations are created, is that the exercise of choice and decision making be seen as an essential part of this process. We have noted how some authors recognize the variability of occupations during constant technology. To claim that human choice is exercised over the creation of new occupations requires a voluntaristic model of human action,<sup>16</sup> and this may be further understood in terms of a theory of the exercise of power, such as that proposed by Lukes.<sup>17</sup> In effect, it will be argued that the ability to make decisions over how work tasks are grouped into occupations, is in large part the ability to control the division of labour itself, and that this therefore constitutes one of the most important areas of decision making in society.

When considered in terms of its total effects, it is not too much to ask how far control over the division of labour is control over the history of social stratification. In the light of this importance, it is surprising how little systematic scholarly attention has been focused on this area. Yet it is interesting to note that a

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<sup>15</sup>The technology is itself the product of purposive human action and can be adapted, as Marx noted in Capital volume 1, where many production processes were changed in order to comply with the Factory Acts.

<sup>16</sup>This conception comes from Parsons who contrasts choice - 'action' in the full sense - with the various forms of determinism, which are theories of the narrower concept of 'behaviour.' See T. Parsons, The Structure of Social Action (1949).

<sup>17</sup>S. Lukes, Power (1974). Lukes distinguished structural determination which is not power, from knowledge together with ability to do otherwise, which is power. Lukes does not relate his ideas to the Parsonian concept of action, although this would provide a useful point of comparison. For a statement of the need for analysis of power in local social structures, see C. Bell and H. Newby, Community Studies (1971), p. 219.

number of works have appeared since this research began, indicating a revival of interest in the origins and effects of the division of labour.

Firstly, there has been a revival of concern with the labour process and how changes in this have wider effects on society. Examples of such work, most of which were published after this research was begun, include the twentieth century studies by Braverman, and the collections of papers by Gorz, and by the Conference of Socialist Economists.<sup>18</sup> Secondly, there has been a concern with the historical origins of work and its social division, as evidence by the theoretical analysis by the Brighton Labour Process Group and others.<sup>19</sup>

Such studies have claimed a central importance for occupation, in particular for what is considered an appropriate reward for that set of tasks.<sup>20</sup> The importance of occupation is that it mediates between changes in the labour process and the resulting changes in class structure, thereby relating technology to the structure of inequality in society.

The nature of this reward for occupations, that is, the total cost of the wages paid out for work tasks done, can be considered in a number of different ways. In its aspect of consumption,

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<sup>18</sup>H. Braverman, Labour and Monopoly Capital: the Degradation of Work in the Twentieth Century (1974); A. Gorz (ed.), The Division of Labour: the Labour Process and Class Struggle in Modern Capitalism (1976); and Conference of Socialist Economists, The Labour Process and Class Strategies (1976).

<sup>19</sup>Brighton Labour Process Group, "The Capitalist Labour Process" in Capital and Class, No. 1 (1977); and M. Berg, K. McLelland and N. Sonescher, "The Labour Process in History: Problems and Perspectives" (1976).

<sup>20</sup>This important theoretical distinction is made by functionalist stratification theorists such as M. Tumin, Social Stratification: the Forms and Functions of Inequality (1967), pp. v-vi.

it is the problem of the standard of living during industrialization, whether considered in aggregate or for the various different groups and categories of workers.<sup>21</sup> When considered as the specific labour costs to an individual firm it will be argued that this has an important influence on the process whereby the division of labour takes place.<sup>22</sup> And when treated as an aggregate cost to society, as the total reproduction costs of labour, it will be suggested that it has influenced social policy from the Factory Acts to the Welfare State. Such at least is the broad scope in which we should consider the effects of the division of labour, through occupational reward, on society as a whole.

This research is therefore a study of the process whereby the redivision of labour takes place during a period of technological change. This redivision of labour was studied in an industrial context because it was there that technology had a big impact, disrupting the previously existing social relations to such an extent that the whole of society could be characterized as 'industrial'.<sup>23</sup> Having chosen a historical time period for the opportunity of studying the origins of an advanced industrial society, it was realized that many questions could be answered using such sources of information as available business records and the household censuses. The two firms chosen for this study fitted these requirements, having both

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<sup>21</sup>This has been a long standing debate amongst economic and social historians and has been conducted through many issues of the Economic History Review. For some reprints of the more important contributions, see P.A.M. Taylor (ed.), The Industrial Revolution: Triumph or Disaster? (1971); and A.J. Taylor, The Standard of Living in the Industrial Revolution (1975).

<sup>22</sup>See below chapter 5.

<sup>23</sup>For the idea of 'industrial society' see pp. 1-4 above and references to Moore and Kerr.

surviving business records and being subject to technological change.<sup>24</sup> The result is a study of a small population of industrial workers and their families, to examine the origins and effects of the redivision of labour.

The approach adopted here does not rely on one chief source of information, nor on one traditional area of academic inquiry; it is interdisciplinary both by personal training, and by theoretical commitment to the avoidance of some of the limitations of established disciplinary boundaries. It will be clear that this research does not fit neatly into any one of a number of familiar forms of academic inquiry. Thus, of works in a historical context, this study is not a local history, nor a study of migration, nor of social mobility.<sup>25</sup> This work is not an economic history of an industry, nor is it concerned mainly with technology, or with management and entrepreneurship.<sup>26</sup>

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<sup>24</sup>Twenty years was considered a minimum time span for this study, although in fact thirty years or more were used in order to gain the fullest possible contrast. See chapter 2 for details of the technical requirements, such as those deemed necessary for record linkage, and the sources used.

<sup>25</sup>For examples of the local histories used in this study, see J.J. Wilson, The Annals of Penicuik Being a History of the Parish and of the Village (1891); and R. Hall, The History of Galashiels (1898). For a recent example see A. Armstrong, Stability and Change in an English County Town: A Social Study of York, 1801-1851 (1974). As examples of migration studies see P.R. Knights, The Plain People of Boston 1830-1860 (1971); and M. Katz, The People of Hamilton Canada West: Family and Class in a Mid-Nineteenth Century City (1975). For a study of social mobility see S. Thernstrom, The Other Bostonians: Poverty and Progress in the American Metropolis, 1880-1970 (1973).

<sup>26</sup>For economic histories of industries see C. Gulvin, The Tweedmakers: A History of the Scottish Fancy Woollen Industry 1600-1914 (1973); and D.C. Coleman, The British Paper Industry, 1495-1860: A Study in Industrial Growth (1958). For primarily technological studies see A.G. Thomson, The Paper Industry in Scotland, 1590-1861 (1974); and H. Catling, The Spinning Mule (1970). For management studies see S. Pollard, The Genesis of Modern Management: A Study of the Industrial Revolution in Great Britain (1965); and R. Bendix, Work and Authority in Industry: Ideologies of Management in the Course of Industrialization (1956).



Nor is this research purely economic, nor a study of standard of living, budgets and poverty, nor yet a study of kinship and family.<sup>27</sup> Finally, this thesis is not a traditional labour history, that is, a study of class consciousness and of the social movements that relate to it.<sup>28</sup> And, while this research does have some contribution to make to most of these areas, none of these is the central theme of this thesis.

What this research does try to do is use the questions asked by sociological theories of modernization to examine the origins of certain typical features of this division of labour in an advanced society. Far from seeing this division, differentiation and ranking of occupations as inevitable or as a functional imperative, this study, on the contrary, by focusing on the specific process of genesis in the concrete instance of two mechanizing firms, will emphasize human decision making and the resulting variation in outcomes. The period of change studied has been called that of the transition from the merely 'formal subordination' of labour to capital, to the 'real subordination' whereby capitalists gained real control over the workplace and the details of the labour process.<sup>29</sup>

The effects of such changes are examined as they influenced the degree of inequality, both overall and for specific categories of

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<sup>27</sup>For an example of econometric history see R.W. Fogel, Railroads and American Economic Growth: Essays in Econometric History (1964). For a local standard of living study see R.S. Neale, "The Standard of Living, 1780-1844: A Regional and Class Study" in Economic History Review (1966). For studies of the family see J.A. Banks, Prosperity and Parenthood (1964); and M. Anderson, Family Structure in Nineteenth Century Lancashire (1971).

<sup>28</sup>For example J.O. Foster, Class Struggle and the Industrial Revolution (1974); E.P. Thompson, The Making of the English Working Class (1963); and R.Q. Gray, The Labour Aristocracy in Victorian Edinburgh (1976).

<sup>29</sup>See Brighton Labour Process Group, "Capitalist Labour Process."

workers and their families, in particular as they affected the major age and sexual categories of the population. This research will therefore attempt to assess the contribution of the parties concerned to the way labour was redivided and to the resulting changes in class composition.

In studying the division of labour the aim of this research was to reveal general patterns and trends, looking for similarity in process and not in concrete specificity. It was not therefore an essential part of this research that the firms chosen were typical of their industries, for the changes observed were not intended to be generalized in this way.<sup>1</sup> On the contrary, it was in some respects important that the firms selected were innovators in their field of production, so that their scope for experimentation and choice would have been less influenced by external factors.<sup>2</sup>

The search for suitable firms to study began with three main requirements: firstly, that the firms concerned should have a good set of business records; secondly, that they were subject to major technological change, usually mechanization during this period;<sup>3</sup> and thirdly, that the firms were located in relatively small communities, for the technical reason of facilitating record linkage. The first condition proved by far the hardest to fulfill. A search of the located business records revealed that there were very few

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<sup>1</sup>In fact the firms selected were larger than average, and this may well be related to the survival of their business records - see comment by Floud noted below.

<sup>2</sup>An example of such an external effect might be the 'demonstration effect' of the earlier industrial practice of another firm.

<sup>3</sup>At a later period, or with a modern study, automation or computerization could have been used. See chapter 7 for discussion of some of these later changes in the production process.



surviving long series of wage books.<sup>4</sup> In fact, only three sets were located for the early or mid-nineteenth century in Scotland, and of these, one was not suitable,<sup>5</sup> so the other two were used.<sup>6</sup> One was the records of the Cowan Paper Company located in Penicuik, Midlothian, and these exist for the whole of the nineteenth century.<sup>7</sup> The other was the records of Ballantyne woollen mills in various locations in the Tweed Valley of the Scottish Borders, which contain an unbroken series of wage records from 1846 onwards.<sup>8</sup> This research was, from its inception, planned as a multi-source study.

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<sup>4</sup>This search was done principally at the Scottish Records Office and the National Register of Archives (Scotland) which is located there. Also searched were the National Library of Scotland, the Public Library of Edinburgh, and the University of Edinburgh Library, Manuscripts Department. The wage books found contain the names of individual workers, their wages on each pay day, and frequently their occupations and other information as well.

<sup>5</sup>This is the large set of business records for Dixon's Colliery, Glasgow, which have been studied by A. Slaven, "Earnings and Productivity in the Scottish Coalmining Industry During the Nineteenth Century: the Dixon Enterprises" in the P. L. Payne (ed.), Studies in Scottish Business History (1967), pp. 217-249. This source was not used because (a) there was no major technological change in coal mining at this period and (b) because the firm was situated in a very large city - see the comments on the record linkage above.

<sup>6</sup>Floud's cautionary comment is relevant here: '...it is a common feature of business history that information has survived largely from those firms that were prosperous and successful; firms that go bankrupt rarely preserve their records, 'R. Floud, An Introduction to Quantitative Methods for Historians (1973), p. 176.

<sup>7</sup>These records are now located at the Scottish Records Office, Edinburgh, but the data was collected while the records were on site at the mill in Penicuik. These records have been used by A. G. Thomson, The Paper Industry in Scotland, 1590-1861 (1974).

<sup>8</sup>These records are deposited in the Library of the University of Edinburgh, and have been used by C. Gulvin, The Tweedmakers: A History of the Scottish Fancy Woollen Industry (1967).

The most important sources were seen to be the all too rare wage books, and secondly, the decennial household census schedules, which are available in Scotland from 1841 to 1891 inclusive.<sup>9</sup> From these two sources it was planned to obtain information on the work lives of the people in these firms from the wage books, and on domestic lives from the censuses.

An important limitation of the available sources is that the mechanization of the paper industry took place in the 1820's and was therefore too early for the workers in this firm to be linked to the household census. The earliest available census schedules are for 1841, and it was thus not possible to obtain family and household information for the paper workers in the early period. This information is therefore listed as missing in a number of tables and is evident in the asymmetry of many tables. The paper firm was included however because the wage book information is of high quality, nearly always giving occupations and other details, and provides many valuable contrasts and comparisons even in the early period.

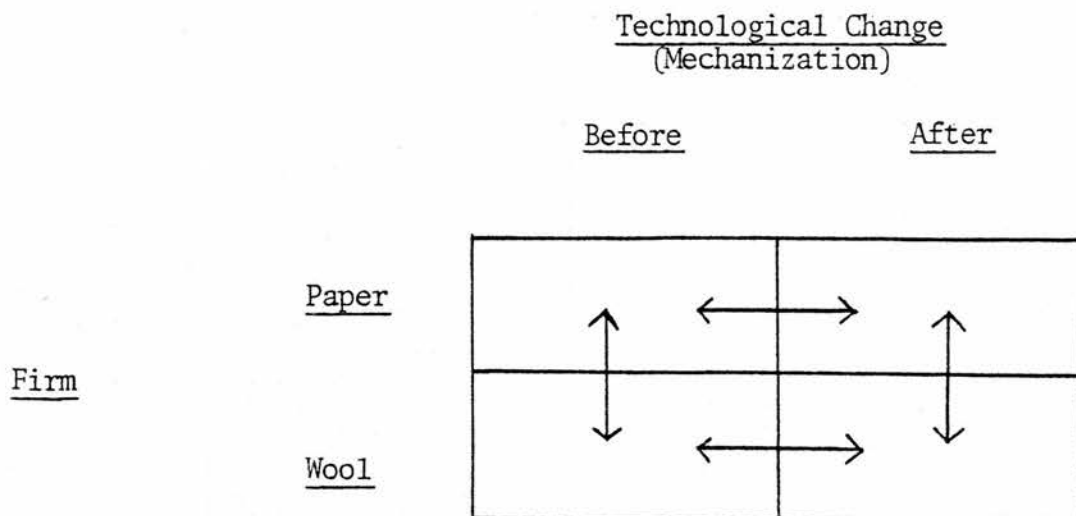
There is a fourfold plan to the main household and industry study - there is the comparison between the two firms and the contrast over time on either side of the technological change. The main comparisons used can thus be schematized as in figure 2.1.<sup>10</sup>

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<sup>9</sup>In England and Wales the latest census currently available is that of 1871. For details of the British censuses see M. Drake, "The Census 1801-1891," in E. A. Wrigley, Nineteenth Century Society (1972).

<sup>10</sup>Of the six potential comparisons between the four cells in the diagram, only four are used in this study, the other two (i.e. the diagonals) having no theoretical basis for comparability.

FIGURE 2.1: DIAGRAMMATIC REPRESENTATION OF THE MAIN COMPARISON POINTS USED IN THIS STUDY



The use of such comparison points implies a kind of sampling, although it is a sampling over time and not the more usual sampling of survey analysis which is synchronic. In the diachronic sampling of the wage books the time periods chosen were determined by the need to be as close as possible to the night when the census data was collected. The sampling method was therefore purposive and not a random sample of a simple or stratified kind.<sup>11</sup> Because the samples in this research are not random samples drawn from a known population, there is no chance of 'sampling error', and since this rationale underlies statistical significance testing, such tests

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<sup>11</sup>There is information on sampling in most of the standard social science textbooks on methods, e.g. H. M. Blalock, Social Statistics (1960), ch. 22; and J. Galtung, Theory and Methods of Social Research (1967), pp. 48-67.

will not be found in the reported tables and statistics.<sup>12</sup> There are of course other possible sources of error<sup>13</sup> and these are noted at appropriate points in the text.

Once it was decided to handle the various records from the different sources by computer<sup>14</sup> it was realized that there would be a number of difficult problems to solve before analysis could begin. The first of these was what is called the problem of 'record linkage',<sup>15</sup> whereby the individuals from one source such as the wage books have to be matched with individuals from another listing such as the census, to produce a united file with records for the correct individual linked. The difficulty of the task of record linkage depends upon the sizes of the two population listings to be linked, and upon the quality of the information relating to each name. Some factors influencing linkage are the reliability of the

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<sup>12</sup>There is of course disagreement on this matter. I follow Galtung, Theory and Methods of Social Research who states 'Thus our main thesis is that statistical tests are out of order if we do not have a sample,' p. 364. See also R. Floud, Introduction to Quantitative Methods for Historians, p. 174, who also takes this view. For an opposite opinion see J. A. Davis, Elementary Survey Analysis (1971), pp. 59-60. 'There remains the problem of applying statistical inference to data which are not probability samples at all...Our advice is to go ahead and calculate confidence limits anyway,' p. 60, note 4.

<sup>13</sup>Other sources of error include mis-allocations, or from the temporary fluctuations that time series analysis reveals. Some effort is made to check on this latter form of error by comparing the findings of this research with that of others. For example, wage levels were compared with those reported by Gulvin, and were in one case adjusted.

<sup>14</sup>The size of the resulting data set and the difficulty of doing the analysis by clerical methods such as card indexing was not realized until eighteen months into this research, and should ideally have been begun much earlier.

<sup>15</sup>Some pioneering work has been done in this field by medical record linkage studies - see notes and references in appendix C.

population lists, the number of 'keys' available upon which to compare each name for possible linkage, and the frequency of occurrence of people with the same name. There are thus two sources of error in this process: there is inevitably some mis-matching of records that do not relate to the same person,<sup>16</sup> and there is some missing data due to non-linkage of records that truly do belong to the same individual. Some of these problems are discussed in appendix C. The actual linkage of records was done manually by visual inspection of computer 'sorted' lists.<sup>17</sup> There are more sophisticated automatic and semi-automatic methods of record linkage, but there is no readily available program to do this.<sup>18</sup> Some notes on method and details of the linkage success rates are given in appendix C.

The second problem was that of handling multiple records. Although a number of sources were found that might have added further useful information, the fact that the standard computer analysis packages can only handle fixed format records<sup>19</sup> meant that only the larger sources were used, namely the wage books, the household census and the property valuation rolls.<sup>20</sup>

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<sup>16</sup>This is a source of what may be called 'linkage error.' Some of these cases can be retrospectively identified as outliers in the analysis.

<sup>17</sup>Details of the data base management are given in appendix B.

<sup>18</sup>The record linkage methods of various research projects are reported in the Historical Methods Newsletter e.g. the Philadelphia Social History Project, in vol. 9, nos. 2 and 3 (1976).

<sup>19</sup>See appendix B for details.

<sup>20</sup>These Valuation Rolls are available in Scotland for each year after 1855-56 and give names of property owners and value of property owned, and sometimes tenants and their occupations too. See chapter 6 for the use made of this source.

The third problem was that of the different levels of analysis, or the units of analysis, such as individuals, occupations and households, needed to be held in different files, since the available computer software did not have the necessary hierarchical file handling capacity.<sup>21</sup> Much research time and effort was thus consumed in solving these problems, and the resulting method used is described in appendix B.

The total size of the main data base used was almost fourteen thousand records, and these were held in thirteen different files. In order to avoid confusion over a seeming profusion of different samples, time periods and table sizes, the relationship between these is outlined in appendix A. In fact not all the analysis was done by computer,<sup>22</sup> and other samples and sources are noted in the text.<sup>23</sup>

To summarize, the aim of the various research methods used was to prepare data bases for the analysis of a population of industrial workers and their families at two points in time, namely, before and after the major technological change of mechanization. It can be seen that this research will be presenting contrasts between distinct structural types, as suggested by the four cells of figure 2.1. The synchronic comparisons reveal different

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<sup>21</sup>Details of this problem are given in appendix B.

<sup>22</sup>Tables presented at the level of the firm or occupation were either aggregated by hand if the numbers were small, or in the case of some occupations, the aggregation and sub-sample analysis offered by the software packages were used.

<sup>23</sup>Three other sources of information may be noted at this point: firstly, in the study of handloom weavers presented in chapter 4, for which census and marriage records were collected; secondly, in the study of wages, for which the five pay periods nearest to census night were collected; and thirdly, in the study of careers inside the firm, where analysis was confined to the male workers and linkages inside the firm's wage books were done manually and added into the workers' data sets.



traditions before mechanization, and any difference in outcome afterwards. However, the main contrast studied are the diachronic comparisons which reveal the process of transition. It is concern with the mechanics of change that unites the two examples, that is, the two firms in this study.

The importance of such mechanics of transition has been stressed by Abrams, and this research may be seen as an attempt to carry out the kind of 'historical inquiry which we should expect, theoretically, to explain phenomena of structural transformation.'<sup>24</sup> The specific mechanism of transition studied in this research is the redivision of labour during mechanization.

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<sup>24</sup>p. Abrams, "The Sense of the Past and the Origins of Sociology," in Past and Present, no. 55 (May 1972), p. 32.

## PART 2: THE REDIVISION OF LABOUR IN TWO FIRMS

### CHAPTER 3: BEFORE MECHANIZATION

As outlined in chapter one, the aim of this research is to contribute to knowledge of industrialization as a whole by making an empirical study of one transition in this process. The purpose of this chapter is to locate within this general context the two firms of this study as they existed prior to the mechanization and re-division of their labour.

This research will be looking at two related kinds of changes that took place in the period before mechanization: firstly, changes in the sphere of production resulted in the concentration of the work force within the firm; and secondly, associated with this development were changes in the sphere of consumption. This chapter will identify some of these interrelations between production and consumption, showing the importance of the family in the organization of work.

The first part of this chapter will therefore concentrate on the changes in the labour process, focusing on the differentiation of occupations. How this simple differentiation turned into ranking, in particular, the actual pay levels associated with each occupation, will be presented next, and some suggestions will be made about the nature of occupational reward. Finally, some themes in the study of the factory family and the family economy will be raised, themes which will recur in the analysis of the social changes described in subsequent chapters.

It will be seen that at many points the means of production



and the 'means of subsistence'<sup>1</sup> are related to each other. The separation of production from consumption took place prior to mechanization and had consequences that remained long after the occupational structures within the firm had taken their modern form. For this reason many of the characteristics of the means of subsistence are common both to the period before and to the period after mechanization and redivision of labour. As a result, the household and subsistence study at both periods will be discussed in chapter 6.<sup>2</sup>

The tendency of Western societies to increase the division of labour and to differentiate their occupational structures has been noted in chapter 1. The productive activities associated with the two firms in this study underwent considerable development before the time of the start of this detailed study. Such changes were clearest in the case of woollen cloth production which being a textile industry, played a central role in the development of the British Industrial Revolution as a whole.<sup>3</sup>

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<sup>1</sup>This concept is the companion to the better known 'means of production.' See K. Marx, Capital, vol. 1 (1976), p. 472. (All subsequent references to this work are to this edition.)

<sup>2</sup>Similarly, other subject matter introduced in this chapter, for example, the origins of pay structures, may, of necessity, remain incomplete as it stands. This is because the present chapter introduces many of the problems of the thesis which can only receive adequate treatment in the full empirical study presented subsequently. The justification for their inclusion at this early stage is that they provide necessary background, and it was felt that the value of making these interconnections outweighed the risks of confusion involved.

<sup>3</sup>For the importance of textiles as an early growth sector of the British economy see P. Mathias, The First Industrial Nation: An Economic History of Britain, 1700-1914 (1969); and D. S. Landes, The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present (1969).

An 'ideal type' starting point of such a development is a state of non-differentiation. However, while it is conceivable that in a peasant smallholding community each person makes their own clothing, the first specializations took place so early that this cannot be a practical starting point for study.<sup>4</sup> The common form of simple differentiation at the level of what may be called simple commodity production<sup>5</sup> can be seen in the description of an 'old country weaver' given by Thomas Dobson.<sup>6</sup> In this situation a weaver lived in a village and wove the cloth from yarn spun by the families of local farmers. In this form of production a local market was served using local materials.<sup>7</sup>

The economic and social relations associated with more extensive trade were of course known in ancient times;<sup>8</sup> and in medieval Europe some of the technology of textile production was developed, notably the fulling mill. The later economic development of Scotland meant that the differentiation of productive activities

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<sup>4</sup>It has been suggested that the first Western differentiation of occupations was of metal workers and perhaps of priests at the time of the Neolithic Revolution. See M. Kranzberg and J. Gies, By the Sweat of thy Brow: Work in the Western World (1975).

<sup>5</sup>For a description of simple or petty commodity production see E. Mandel, Marxist Economics (1968), pp. 65-68.

<sup>6</sup>T. Dobson, Reminiscences of Innerleithen and Traquair (1896), who describes his boyhood in mid-century. Such custom weaving is another example of how late old methods survived.

<sup>7</sup>The separation of production from consumption also implies a separation of the personal relationship to the product, as well as the more commonly discussed relationship with the value of that product. While this research concentrates on part of the latter, namely the relationship between pay and family needs for the producer, there remains the largely unresearched and unsystematized area of the changing nature of control over the quality of commodities and the market in which they are sold.

<sup>8</sup>See E. Mandel, Marxist Economics, pp. 25-42.

took place later and, when it did, more rapidly than in England. Thus the first fulling mills were erected in Galashiels in the late eighteenth century, and other technical changes occurred in the early years of the nineteenth century. The main changes took place in the preparatory or carding processes and in the mechanization of spinning.<sup>9</sup>

Thus when we begin the detailed study of the woollen firm in Galashiels in the late 1840's, there had been a considerable number of differentiations and specializations, and these will be discussed in turn. In the case of paper production, it is doubtful whether this was ever a domestic form of production: it was on the contrary an artisan form of production that remained little changed from its first appearance in the Middle Ages until we begin the study of the firm in Penicuik in the early years of the nineteenth century.<sup>10</sup>

One of the most noted effects of the Industrial Revolution was the concentration of workers into large units of production. This proceeded in the two firms of this study so that, far from there being isolated country weavers, there were over 80 workers in the woollen firm. In the paper firm an even larger number, namely 120 employees, were gathered together.<sup>11</sup>

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<sup>9</sup>Changes in the late eighteenth century are described in R. Hall, History of Galashiels (1898), and in C. Gulvin, The Tweedmakers: A History of the Scottish Fancy Woollen Industry (1973). A clear and simple description of the changes taking place at the turn of the nineteenth century is given by K. McKechnie, A Border Woollen Town in the Industrial Revolution (1968).

<sup>10</sup>For descriptions of the early paper production process see D. C. Coleman, The British Paper Industry, 1495-1860: A Study in Industrial Growth (1958); and see under "Paper" in Encyclopedia Britannica (1810 edition).

<sup>11</sup>The significance of the size of the industrial enterprise has been examined in the modern context by G. Ingham, Size of Industrial Organization and Worker Behaviour (1970).

There were thus two processes going on simultaneously and in an interrelated fashion: there was both differentiation of labour into distinct occupations, together with concentration of workers into larger units of production. Two traditions of theory in the division of labour have tended to stress one or other of these tendencies. Associated with Durkheim has been an approach that stresses differentiation and specialization of functions, while the other tradition associated with the work of Marx has focused on the concentration of workers and the creation of common conditions of work.<sup>12</sup>

The extent of the division of labour can be established from the number of distinct occupations,<sup>13</sup> and as such, it is distinct from the concept of 'concentration of workers' which depends both upon the number of occupations and the number of workers in each occupation. In this way the Durkheimian and Marxian emphases in the division of labour stress related but in some ways contradictory processes: at the same time that there was differentiation of occupations there was also concentration of workers.<sup>14</sup>

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<sup>12</sup>E. Durkheim, The Division of Labour in Society (1964); K. Marx and F. Engels The Communist Manifesto, reprinted in D. McLellan The Thought of Karl Marx (1971), p. 163.

<sup>13</sup>In empirical studies we are actually dealing with occupational titles. It is necessary to study the work tasks done by workers with each title in order to decide whether each verbally different title is a substantively different occupation. This is a particularly common problem in wool work where many processes have multiple names, e.g. napping and cropping; fulling and felting; burling and darning, etc. It should be noted that a distinct title does not necessarily imply specificity of tasks: some jobs titles involve a range of work tasks, either because the labour process is undifferentiated, e.g. peasant, or because there is task rotation amongst detail workers e.g. factory hand, dyer's labourer.

<sup>14</sup>Failure to make this distinction mars most discussions of the division of labour. A partial exception is H. Braverman, Labour and Monopoly Capital: The Degradation of Work in the Twentieth Century (1974), chapter 3.

TABLE 3.1: TOTAL EMPLOYEES, DISTINCT OCCUPATIONS, AND CONCENTRATION OF WORKERS, IN TWO FIRMS BEFORE MECHANIZATION, BALLANTYNE'S 1851 AND COWAN'S 1810.

	Total Employees	Distinct Occupations	Employees per Occup- ation	Percentage of Total Employees in Two Largest Occupations
	n	n	$\bar{x}$	%
<u>Paper</u> Cowan's 1810	120	17	7.06	47
<u>Wool</u> Ballantyne's 1851	82	11	7.45	67

Source: Wage books, Ballantyne's 1851 and Cowan's 1810.

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Evidence of this phenomenon is given in table 3.1, which shows that although the number of occupations expanded (from a hypothetical one - see page 19-20 chapter 3), the concentration of workers in occupations was still great, with almost half or more workers in the two largest occupations. The social and political impact of concentration that Marx and Engels had in mind might have equally well come from absolute numbers: instead of scattered country weavers, the woollen firm in the mid-nineteenth century had 28 weavers working in one weaving shed. The significance of concentration for Marx and Engels was that, in contrast with the particularity and uniqueness of small scale production, the large work place provided common conditions and experiences that were conducive to the production of common culture and expectations. Secondly, it allowed communication and hence permitted collective organization and action to take place, both of which would have been difficult to achieve with individuals far apart. While domestic outwork had effectively proletarianized the work force, the concentration of workers was seen by Marx and Engels as

completing this process. By concentrating its workers, capitalism created the forces that would overthrow it by creating the conditions for the proletarians to act for themselves.<sup>15</sup>

Both the processes of differentiation and of concentration are shown in table 3.2, which gives the kinds of occupations that appeared in the two firms before mechanization, together with their frequencies of occurrence.

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<sup>15</sup>Marx and Engels, The Communist Manifesto.

TABLE 3.2: OCCUPATION,\* PERCENTAGE OF WORK FORCE, AND SEX OF EMPLOYEES, IN TWO FIRMS BEFORE MECHANIZATION, BALLANTYNE'S 1851 AND COWAN'S 1810.

<u>Wool</u> 1851			<u>Paper</u> 1810		
Occupation	Percentage of Work Force % (n)	Sex	Occupation	Percentage of Work Force % (n)	Sex
Weaver	34 (28)	m	Salle Picker	24 (29)	f
Winder	33 (27)	f	Ragcutter	23 (27)	f
Finisher	6 (5)	m	Coucher	7 (8)	m
Burler	6 (5)	f	Dryworker	6 (7)	m
Dyer	5 (4)	m	Parter	6 (7)	m&f
Spinner	5 (4)	m	Layer	6 (7)	m
Carder	4 (3)	m	Vatman	6 (7)	m
Sorter	4 (3)	m	Presser	4 (5)	m
Millwright	1 (1)	m	Millwright	3 (4)	m
Warper	1 (1)	m	Engineer	3 (4)	m
Foreman	1 (1)	m	Feltcaster	3 (4)	m
			Finisher	3 (3)	m
			Foreman	2 (2)	m
			Bleacher	2 (2)	m
			Sizer	2 (2)	m
			Fireman	1 (1)	m
			Sundries	1 (1)	m
	<u>100</u> (82)			<u>102</u> (120)	

Source: Wage books, Ballantyne's 1851 and Cowan's 1810.

Note: \* Apprentices not distinguished.



The importance of the differentiation of occupations is that it involves the clustering together of work tasks of specific kinds. The central importance of this act of grouping practical tasks has been insufficiently stressed in previous studies of the division of labour. As noted in chapter 1, the division of labour involves the separation out of distinct 'occupations' from the sum of necessary productive acts done in a society. This process has been analytically distinguished by stratification theorists, such as Tumin, who rightly stress the distinction between differentiation and stratification.<sup>16</sup> Thus, Tumin distinguishes four major processes, namely, differentiation, ranking, evaluation and reward, and stresses that these should be treated as separate processes.<sup>17</sup> However, while correctly emphasizing the importance of evaluation, these stratification theorists treat this evaluation as subsequent to the creation of the roles that are evaluated.<sup>18</sup> As a result, they tend to neglect the possible importance of these values in influencing the way that the roles were themselves created, that is, in the way in which labour is divided.

In contradistinction to such functionalist stratification theorists, it will be suggested by this research that the 'value system' cannot be treated as an independent variable in specific ranking situations. This argument will become clear when we

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<sup>16</sup>M. Tumin, Social Stratification: The Forms and Functions of Inequality (1967); and also S. N. Eisenstadt, Social Differentiation and Stratification (1971), chapter 1. Equally, this point is made by a critic of functionalist theories; '...differentiation does not in itself imply any distinctions of rank or value among the differentiated elements,' R. Dahrendorf, "On the Origin of Inequality among Men," in Essays in the Theory of Society (1958), p. 162.

<sup>17</sup>Tumin, Social Stratification, pp. v-vi.

<sup>18</sup>This is clear from the order and treatment of Tumin's third and fourth chapters in op. cit.



examine the evidence in the creation of new jobs during mechanization. For the pre-mechanization work force, all that will be attempted is to show some of the interconnections between the qualities of the differentiated occupations and the pay levels they generated in order to show what cultural values may have been relevant. This section will therefore be presenting a synchronic or structural picture of the bases of stratification showing the association of relevant variables. Only with the diachronic analysis of the genesis of new occupations later, will we have an opportunity to suggest distinctions between independent, causally prior, variables and others. We must therefore defer what is, in this research, an extended critique of certain ideas of functional stratification theory.

The specific situation before mechanization, which we may call true manufacture as distinct from 'machinofacture,' will be related to two distinct sets of cultural and historical values.

The first concerns adult male wages and relates to the tradition of artisan work, in particular, we shall be concerned with analysing the notion of 'skill.' The second concerns the pay of women and children, and we will suggest the importance of family and domestic roles on the world of work.

In examining an instance of the relationship between reward and cultural values we need to measure wage payments, <sup>and</sup> in a way that accurately reflects their relative level during periods of change in money wages. The most commonly used method is ~~the~~ **the creation of** an index based upon the mean value of the wages paid to all workers. While this method was considered, it was rejected because its stability depends upon constant occupational composition or upon

changes that exactly cancel each other out.<sup>19</sup> In contrast, the method chosen for this study is based on the 'labourer wage,' that is, the level at which an adult male basic worker is paid. While there are a number of assumptions and problems with this method,<sup>20</sup> it was preferred because it enables accurate relative comparisons to be made in situations of radical change in the age and sexual composition of the work force.

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<sup>19</sup>The average wage method is used, for example, by C. Gulvin, The Tweedmakers, table 10, p. 169; and a warning is required in the text about the effect of changed occupational composition. Mean wages were calculated, and the results were close to the labourer wage in the case of the woollen firm, but biased in the case of paper by precisely these composition changes. Mean paper wages (shillings per week): 1810 = 11.40, 1851 = 7.84.

<sup>20</sup>The chief assumption of this method is that a labourer's wage means the same thing in different places and different times. Some support for this idea is to be found in Marxian political economy, in the proposition that a tendency exists towards the equalization of working conditions - see Glossary in C. S. E., On the Political Economy of Women (1976), pp. 34-37. The main problem is in the determination of the actual 'labourer wage' of any specific locality and time. Frequently labourers as such exist, for example, those used by E. H. Hunt, Regional Wage Variations in Britain, 1850-1914 (1973), that is, agricultural labourers, building labourers and policemen. In this study, for the earlier period, agricultural labourers' wages were used as a basis, being raised about a shilling a week to allow for the conventionally higher pay of factory work. The labourer wage levels used in this study were in shillings per week; Paper 1810 = 10/-; 1841 = 10/-; 1851 = 10/- Wool 1851 = 10/-; 1861 = 13/-; 1871 = 16/-; 1881 = 18/-. Sources used to estimate labourer wages include New Statistical Account of Scotland; Poor Law Inquiry (1844); Wilson, Annals of Penicuik; and Hunt, Regional Wage Variations.

TABLE 3.3: OCCUPATIONS AND WAGE DIFFERENTIALS IN TWO FIRMS BEFORE MECHANIZATION, BALLANTYNE'S 1851 AND COWAN'S 1810.

<u>Wool</u> 1851				<u>Paper</u> 1810			
Occupation	Wage*	Percentage of Work Force		Occupation	Wage*	Percentage of Work Force	
	$\bar{x}$	%	(n)		$\bar{x}$	%	(n)
Spinner	2.50	2	(2)	Foreman	3.80	1	(1)
Foreman	2.00	1	(1)	Sizer	2.60	1	(1)
Carder	2.00	1	(1)	Foreman	2.00	1	(1)
Warper	1.75	1	(1)	Engineer	2.00	3	(4)
Dyer	1.70	1	(1)	Vatman	2.00	6	(7)
Finisher	1.40	5	(4)	Finisher	2.00	2	(2)
Weaver	1.32	31	(25)	Coucher	1.95	7	(8)
Sorter	1.20	2	(2)	Millwright	1.90	2	(2)
App. Dyer	0.80	4	(3)	Dryworker	1.70	2	(2)
App. Weaver	0.80	4	(3)	Bleacher	1.40	2	(2)
App. Spinner	0.75	2	(2)	Presser	1.10	4	(4)
App. Sorter	0.75	1	(1)	Parter (f)	0.85	2	(3)
App. Finisher	0.60	1	(1)	Fireman	0.75	1	(1)
Winder	0.60	16	(13)	App. Finisher	0.75	1	(1)
Engineman	0.50	1	(1)	App. Dryworker	0.70	4	(5)
Burler	0.47	6	(5)	App. Millwright	0.60	2	(2)
App. Carder	0.45	2	(2)	App. Presser	0.60	1	(1)
Winder (part time)	0.20	17	(14)	Salle Picker	0.58	24	(29)
				Ragcutter	0.52	23	(27)
				Layer	0.40	6	(7)
				App. Sizer	0.35	1	(1)
				Parter (boy)	0.30	3	(4)
				Feltcaster	0.25	3	(4)

TABLE 3.3 - Continued

<u>Wool</u> 1851			<u>Paper</u> 1810		
Occupation	Wage*	Percentage of Work Force	Occupation	Wage*	Percentage of Work Force
	$\bar{x}$	% (n)		$\bar{x}$	% (n)
			Sundries	0.20	1 (1)
		$\overline{99}$ (82)			$\overline{103}$ (120)

Source: Ballantyne's wage books 1851; Cowan's Wage books 1810.

Notes: Differentials are based on the mean wage for that occupation. The woollen workers, weavers and spinners, being on piece wages, had a high standard deviation, whereas the paper workers had very little of this variation.

The wage differentials of apprentices are probably not significant between occupations, since the small numbers and rapid wage change with age mean that these are subject to 'error' from the different ages of the apprentices.

\* Wages in labourer wage equivalent units, labourer wage = 1.0.

The use of this labourer wage method in revealing occupational differences in pay is shown in table 3.3. This, together with the differentiation by sex shown in table 3.2, enables us to give a picture of the impact of previous artisan traditions upon the adult male pay levels. In this respect we can see something of a contrast between the two firms. The fact that in the paper industry the adult male workers earned such high wages suggests that they conformed to the pattern of the traditional skilled artisan. Such artisans, Hobsbawm suggests, earned about twice their labourer's wages in the first half of the nineteenth century.<sup>21</sup> In fact about 70 percent of the full rate male workers in the paper firm were in

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<sup>21</sup>E. J. Hobsbawm, "The Labour Aristocracy in Nineteenth-Century Britain," in Labouring Men (1964), p. 291.

the narrow band between 1.95 and 2.0 on the labourer wage scale (see table 3.3) indicating that precisely this kind of highly rewarded artisan situation existed in the paper firm.

In the woollen firm, on the other hand, the dispersion of adult male earnings was greater, and yet some basis for such differences can be discerned. The small proportion of men paid at about twice the labourer wage (only 11 percent compared with 70 percent in paper) were, apart from one foreman, workers operating power driven machinery which had been introduced relatively early. According to Jones, such workers as textile spinners had, in general, after mechanization, attempted to achieve a status equal to that of the traditional artisans, and the woollen firm's spinners and carder appear to have followed this pattern.<sup>22</sup>

The bulk of the male woollen workers before mechanization were, of course, weavers. With their wide variation in piece-work earnings (standard deviation= $\pm 0.3$ ) they gave the adult male distribution of earnings a more dispersed profile with a mean of about one third more than a labourer (see table 3.3). Such weavers were clearly not traditional 'skilled' artisans, but rather, it may be suggested that their recent origins as domestic outworkers, combined with the continued practice of outwork, excluded them from the category of 'labour aristocrats.' The continued impact of domestic work upon loomshop weavers will be taken up again in the discussion of resistance to mechanization. It may be concluded that the woollen handloom weavers were a medium high paid non-aristocratic labour force.

While the paper workers may be considered aristocrats of

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<sup>22</sup>G. Stedman Jones, "Review of Foster," in New Left Review, no. 90 (1975), pp. 50-51.

labour by virtue of their pay levels, they did not have a divisive reward structure: in fact, since the bulk of adult male workers were so closely grouped in pay, there can be said to have been a certain egalitarianism about these artisans. This will be seen to have been in marked contrast with the divisive character of high pay in both firms after mechanization.

Concern with the traditions in which the adult male artisans conducted their work leads us to consider in more detail the mechanisms whereby job content was related to reward. The explanation of earned income inequality has attracted the attention of social theorists from various academic disciplines, including economists, psychologists and sociologists. Some of these theories have been summarized and reviewed by Atkinson, who categorizes these in relation to differences in the working of the labour market, differences in individual abilities, and differences in training requirements for jobs.<sup>23</sup>

The classical economic theory of Adam Smith was that the free action of the market would create an equalization of net advantages.<sup>24</sup> We may therefore ask whether the high pay of adult males was due to compensation for unpleasant conditions of work. However, since we are trying to explain long term differences and not a tendency to equalization, we shall focus on obstacles to the operation of supply and demand forces, in particular, on the restriction of entry into the top occupations. A sociologist might be more inclined to describe the latter purely in terms of power relations. Thirdly, the 'human capital' theory will be

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<sup>23</sup>A. B. Atkinson, The Economics of Inequality (1975), pp. 78-79.

<sup>24</sup>Atkinson, op. cit., p. 79.

suggested to be the least appropriate theory in the explanation of nineteenth century industrial wage differences, since most training was of the 'on the job' kind and required no expensive or prolonged schooling.<sup>25</sup> Finally, some attention will be given to the impact of ability, especially in relation to the notion of 'skill.' At this point the discussion will be related to the sociological functionalist concern with evaluation.

The question of the nature of economic reward for occupations, and in particular of the theory of compensation for disadvantages, requires the fullest possible knowledge of the actual work tasks carried out. Of course, the details of the shopfloor activities of the workers in the two firms of this research are not available in the kind of detail that is possible for a modern 'participant observation' study or by managerial 'work study' methods.<sup>26</sup> However, such knowledge is being increasingly seen as of major importance, and writers such as Braverman have severely criticized attempts to estimate such things as 'skill' without detailed knowledge of the work tasks involved.<sup>27</sup>

Fortunately, during periods of relatively stable technology, the process of production becomes conventionalized in form, fairly widely known and comparatively well documented. Such was the case in paper production by hand, where the particular activities of the vatman, coucher and layer are known, together with the time taken to

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<sup>25</sup>See below, chapter 6, pp.152-153.

<sup>26</sup>See H. Benyon, Working for Ford (1973); and T. Nichols and P. Armstrong, Workers Divided (1976). For detail possible with work study methods see Braverman, Labour and Monopoly Capital, pp. 319-326.

<sup>27</sup>Braverman, op. cit., pp. 106-107.



build up a 'post' of paper, press it and begin again - in other words, the rhythm of a day's work.<sup>28</sup> Details of woollen productions are equally well known due to the interest generated in textile machinery and methods during the first half of the nineteenth century.<sup>29</sup>

Such knowledge of working conditions enables us to look briefly at what some theories of reward suggest about the high pay of the handicraft workers. The theory of high pay as a compensation for disagreeable working conditions has a certain plausibility at first sight, since the artisans in both firms did have such hardships. In hand paper production the vat crew had to contend with the dirt from the vat heating system, and the vatman and coucher suffered constant heat and strain on their backs. Charles Cowan, the owner of the paper company, describes their labour thus:

'The labour imposed upon the vatman and coucher, owing to their constant stooping posture, aggravated by the heat of the vat and often dense steam, is peculiarly severe. I do not consider it as actually unhealthy, but I am confident that such men become prematurely old, and at fifty years of age have the appearance of having reached fully the "threescore and ten".'<sup>30</sup>

Similarly, in the case of woollen handloom weavers, there was physical strain involved in the work position, it being necessary to work with the back bent and unsupported, while moving the hands and feet.<sup>31</sup>

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<sup>28</sup>Old Statistical Account of Scotland, Lasswade Parish, vol. X, p. 270; Encyclopedia Britannica (editions of 1817, 1842 and 1859); Coleman, British Paper Industry; D. Bremner, The Industries of Scotland (1868).

<sup>29</sup>The Statistical Accounts; Bremner, op. cit; Encyclopedia Britannica; and McKechnie, Border Woollen Town.

<sup>30</sup>C. Cowan, Reminiscences (1878), p. 68.

<sup>31</sup>McKechnie, op. cit., pp. 65-65.

However, that unhealthy conditions should have been compensated for by high pay, seems implausible given that many jobs were equally or more unpleasant yet very low paid. For instance, the hard physical work required of the road or building labourer was rewarded at only a basic minimum level, and within the firms, occupations with unhealthy conditions were not highly paid. One such case was that of rag cutting in paper productions, which required some physical strength to pull the rags against an upright knife, and which resulted in an atmosphere thick with dust. Like the millowner Cowan, the commentator Bremner did not seem willing to admit that working conditions were actually unhealthy, and he describes the atmosphere as having only 'a very unhealthy appearance.'<sup>32</sup> However, the medical report in the Childrens Employment Commission Report of 1843 was in no doubt as to its unwholesomeness, linking the dust to pulmonary consumption.<sup>33</sup> Since such women workers were paid about half that of a common labourer, there seems little reason to believe that there was a compensatory basis for occupational reward.

Of more use in explaining the high wages of artisans seems to be the set of restrictions and limitations upon entry into such occupations, which economists treat as interferences with the operation of market forces and which sociologists would regard as the exercise of social power. One of the most important of these forms was apprenticeship, which was the practice of the woollen handloom weavers. The 25 weavers in 1851 had a total of 4

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<sup>32</sup>Bremner, Industries of Scotland, p. 330 (emphasis added).

<sup>33</sup>Second Report of the Childrens Employment Commission, Parliamentary Papers, vol. XV (1843), Paper Mills, evidence of Dr. Reid.

apprentices working with them, the apprentices being paid a fraction, for example, a half, of the full adult piece rate.<sup>34</sup> The restriction of weaving to those who had completed an apprenticeship, and, almost as important, the limitation of the number of apprentices trained, were important ways in which the supply of weavers could have been limited. Gulvin cites evidence of weavers using this power to prevent the entry of depressed Glasgow cotton weavers into the better paying Border woollen industry.<sup>35</sup>

In the paper firm, top artisans like the vatman and coucher did not have apprentices to their specific occupations. This was because their work tasks were considerably differentiated, hand paper making being the work of what was called the 'vat crew.' They worked as a team and had lower paying jobs for younger males in which they served apprenticeship. The occupational structure of hand paper making was in its promotional ladder very similar to that described by Scott amongst the glassworkers of the South of France. Thus it was possible, as a boy grew older to become in turn feltcaster, parter, layer, coucher and vatman, just as in glassmaking he could become porteur, gamin, grand garçon and at the top, souffleur.<sup>36</sup> In papermaking the limitation on numbers was enforced through the fixed number of workmen per vat, so that promotion could occur only through the departure or death of a senior man, or through genuine expansion of production by the building of another vat.

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<sup>34</sup>Source: Ballantyne wage books 1851 - see table 3.3.

<sup>35</sup>Gulvin, Tweedmakers, p. 183. A similar comment appears in the Report of J. C. Symons, Reports of Assistant Handloom Commissioners, Parliamentary Papers (1839), XLII, p. 42.

<sup>36</sup>J. W. Scott, The Glassworkers of Carmaux: French Craftsmen and Political Action in a Nineteenth-Century City (1974).

It was true of course that while a worker was apprenticed and therefore low paid, he was a source of cheap labour for the firm. It has been emphasized by Thompson that the debasement of apprenticeship could take place, for example, as happened in the 'dishonourable' London trades.<sup>37</sup> If there were large numbers of apprentices and the turnover rate was high, the result might have been that few apprentices actually reached the rank of craftsman. However, the low rate of turnover amongst paper workers suggests that promotion prospects were reasonable in this industry, while in the woollen firm the low proportion of apprentices in relation to journeymen (less than 1:6) does not indicate debasement of this system.<sup>38</sup>

The use of apprenticeship and ladders of promotion was not the only way in which traditional artisan practices limited the influence of supply and demand forces. It was a feature common to both firms that there was no such thing as an unskilled adult male worker - there were no 'labourers' nor simple 'factory hands.' There was no case of a career 'labourer', that is, a man who could not expect promotion to higher paying work. This leads to the somewhat paradoxical situation that we can use the way that unskilled work was done to help define the nature of artisan skill.

In handicraft production as found in these two firms, the unskilled work of assisting, fetching and carrying may have been done in part by apprentices or youths who could expect to learn the 'trade' and climb a career ladder that reached full artisan status.

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<sup>37</sup>E. P. Thompson, The Making of the English Working Class (1968), pp. 276-279.

<sup>38</sup>Turnover and mobility of artisans are discussed in chapter 4.

But as we shall see, since this is a theme that is central to this research, the structuring of unskilled work meant that highly paid men were doing all sorts of unskilled tasks, and this had immense implications for the control over and future development of the labour process.

In attempting to explain adult male differentials, mention has many times been made of 'skill,' and this attribute of work has received considerable attention in studies of the Industrial Revolution and twentieth century changes in the labour process. Work by the Hammonds and later by Thompson suggests that the Industrial Revolution was catastrophic for many skilled occupations;<sup>39</sup> on the other hand, it has been claimed that the Industrial Revolution created as many new skills as it destroyed old ones.<sup>40</sup> For the later period in the division of labour, it has been suggested that the modern labour force can be described in terms of skill, in particular that factory workers are at least 'semi-skilled' in comparison with unskilled workers in, for example, the agricultural sector.<sup>41</sup> The number of critiques of the latter approach,

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<sup>39</sup>See J. L. and B. Hammond, The Skilled Labourer, for the effects on croppers and combers in wool textiles; and Thompson, The Making of the English Working Class, chapter 8, "Artisans and Others."

<sup>40</sup>For example in the new engineering industries, in calico printing, and in railways. See R. M. Hartwell, "The Rising Standard of Living in England, 1800-1850," in Economic History Review, 2nd. ser., vol. 13 (1960-61), pp. 397-416.

<sup>41</sup>For example, the Registrar General's classification of occupations; W. A. Armstrong, "The Use of Information about Occupation," pp. 198-281, in E. A. Wrigley, Nineteenth Century Society (1972).

particularly by Braverman<sup>42</sup> have made it clear that the concept of skill is a highly ambiguous one, and that it cannot be used in any simplistic manner.

In the first place, 'skill' is a concept that has many dimensions, and we may begin by looking at one of the most accessible, namely, the exercise of manual dexterity. In this aspect of skill, women workers have traditionally excelled,<sup>43</sup> and it becomes clear that correlation between dexterity and high pay is non-existent or even negative. This was the finding of a simple operationalization of dexterity by its presence or absence in an occupation, and of pay in terms of a dichotomization at the labourer wage. The resulting correlation, using Yule's Q, was of virtually no correlation in the case of wool (+0.14), and of a strong negative correlation in the case of paper (-0.86), due to the large proportion of low paid women cutting rags in the latter firm.<sup>44</sup> These figures suggest that if 'skill' is a term that is useful in talking about high pay, it does not refer to the element of skill involving manual dexterity -

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<sup>42</sup>Braverman, Labour and Monopoly Capital, chapter 20, "A Final Note on Skill", is very important. For a multi-dimensional approach to the classification of occupations, see T. Hershberg and R. Dockhorn, "Occupational Classification" in Historical Methods Newsletter, vol. 9, nos. 2 & 3 (1976), pp. 59-68.

<sup>43</sup>Evidence of C. J. Wilson, Q7500-7501, Parliamentary Papers (1892).

<sup>44</sup>This is based on the 11 occupations in the 1851 woollen firm wage books and on the 17 occupations in the paper firm wage books in 1810. Job descriptions come from the cited economic histories, various editions of the Encyclopedia Britannica, the Statistical Accounts, and Bremner's Industries of Scotland. The method used, although based on crude dichotomies, is probably as good as can be managed from the available descriptions of the work tasks done by each occupation. The comparable figures for the correlation of dexterity with high pay in the post-mechanization work forces are, in the woollen firm (1881) +0.06, and in the paper firm (1851) -0.94, showing the relationship to be substantially unchanged during the period.



for, while women possessed the latter quality in many cases, they were consistently low paid.

It may be concluded that the term 'skill' used in reference to highly paid adult male workers implies something other than manual dexterity, but upon closer inspection these other qualities are hard to define and contain some paradoxical elements. In particular, it has been noted that the absence of labourers in these firms meant that these 'skilled' occupations involved tasks that would later be carried out by 'unskilled' workers. Yet by their high pay levels, the vatmen and couchers, and the spinners, and weavers were all what are conventionally known as 'skilled workers.'

While this leaves the nature of such artisan skill somewhat obscure, we may conclude that the high pay of traditional artisans relates to this fact of 'craft skill.' Furthermore, this craftsmanship was based not alone on some simple aspect of skill such as dexterity, but also related to the power and control over the labour process associated with apprenticeship and ladders of promotion. The specific qualities associated with craftsman status will be examined in chapter 4 when we consider the impact of mechanization on weavers and papermakers.

In conclusion it may be noted that many modern attempts to explain high wages in terms of skill suffer from the defect identified by Braverman of confusing real skill with the attributes of power relations that constitute what is socially recognized as the 'skilled worker.'<sup>45</sup> This should caution us against the naive use of 'skill' either as a functional 'value' by stratificationists, or as a reason for high pay in industrial studies.

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<sup>45</sup>Braverman, Labour and Monopoly Capital, pp. 213-222, and see especially the table on pp. 218-219.



The other main aspect of reward for occupations concerns the wages of those who were not such artisans, that is, the women and young persons who constituted in both firms the majority of the work force. It can be seen from table 3.3 that most female wages had their mean in the range 0.5 to 0.6 of an adult male labourer's wage, which was less than half the adult male artisan's earnings in both firms. This strong association of female sex with low wages was a marked feature of these firms at this period. In the case of a young male, usually described as a 'lad', wages seem to have been proportional to age rather than to the level paid to the adult in that occupation. As a result, the mean wage of apprentices did not follow the same rank order as that of the adult journeymen (see table 3.3.)

Some explanation for this pattern of reward may come from a look at the kind of tasks done by such low paid workers. One of the most marked features of the labour force in both firms was that women held so few of the different occupations and that the sexual segregation of jobs was so complete, as to concentrate them highly in a few occupations. Table 3.2 shows that in wool and paper, females comprised respectively 40 percent and 50 percent of the work force. Yet in the former, all the women were in two occupations, and in the latter the two largest occupations contained 93 percent of all females employed. Thus we can see that women workers were found to be highly concentrated in a small number of occupations, these being preparatory and finishing processes in the case of paper, and a non-mechanized intermediate step (winding) and finishing in the case of woollen cloth production. Both firms show that female work was highly segregated, with the vast bulk of it concentrated in two occupations in each firm.

It is interesting to see what common features there were to the practical tasks done by these women. The work done by these women workers was, in all cases, light but arduous and non-mechanized, and, as we have already noted, frequently requiring great manual dexterity. This was particularly true of the ragcutters in paper production and of the burlers who corrected faults in finished woollen cloth.<sup>46</sup> Furthermore, the work tasks carried out were relatively narrow in scope, being confined to a few repetitive movements and having a short 'job cycle time,' indicating little intrinsic satisfaction in the jobs done.<sup>47</sup>

Such segregation and concentration, together with the narrow scope of the work tasks done by female workers, suggests that the explanation for such women's work and low pay must lie outside the work tasks done and relate to some non-workplace attributes of the workers involved. Some clues as to the nature of this pattern of reward come from a look at the allocation of tasks in the division of labour of the woollen firm before mechanization. In many ways the age and sexual division of labour in the woollen firm was like that of the traditional textile family production unit described by Smelser.<sup>48</sup> The adult males did the weaving; wives did winding; daughters did burling and finishing; and sons did carding, piecing

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<sup>46</sup>Descriptions of these occupations come from the following sources; Encyclopedia Britannica (1810 and 1842 editions); Bremner, Industries of Scotland; Gulvin, Tweedmakers, especially Glossary, pp. 191-194; and K. G. Ponting (ed.), Baines's Account of the Woollen Manufacture of England, p. 71-73, and Glossary, pp. 145-165.

<sup>47</sup>The concept of 'job cycle time' is used by industrial sociologists and in business studies, for example in indicating dissatisfaction and hence labour turnover. See I. R. Anderson, "A Study of a Firm's Labour Turnover Problem," M.Sc. thesis, University of Edinburgh (1970), p. 73.

<sup>48</sup>N. J. Smelser, Social Change in the Industrial Revolution (1959).

and were apprentice weavers (see table 3.4). This strong legacy of domestic production suggests that we should look at family roles in the sphere of consumption and reproduction of labour as the source of the social evaluation of work roles of women and young persons.

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TABLE 3.4: SELECTED WOOLLEN OCCUPATIONS AND RELATIONSHIP TO HEAD OF HOUSEHOLD, BALLANTYNE'S 1851.

<u>Occupation</u>	<u>Relationship to Head (modal category)</u>	<u>Percentage in the Mode %</u>
<u>Weaver</u>	Head	77
<u>Apprentice</u>		
Weaver	Son	100
Other	Son	100
<u>Winder</u>		
Full-time	Daughter	89
Part-time	Wife	54
<u>Burler</u>	Daughter	75

Source: Wage book/census linkage Galashiels 1851.

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That employers did use such broad age and sexual categories in evaluating their work forces seems clear from the kind of distinctions conventionally drawn between 'lads' and 'men' on the one hand, and between 'girls' and 'women' on the other. This fourfold distinction was made by employers in their returns to the census enumerators and to the factory inspectors, but the number of 'boys' and 'girls' seems deflated.<sup>49</sup> This may have been due to the adoption by employers of the somewhat arbitrary cut-off points of 13 and 18 years of age used by these government bodies to avoid

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<sup>49</sup>For example, in the census of 1881 of Walkerburn, David Ballantyne reports boys and girls totaling 16 percent of the work force. *In fact a higher proportion, namely 24 percent,*<sup>5</sup> revealed by the wage book and census linkage of individuals to have been under 18 years of age.

giving an impression of their work force as unduly juvenile. However, in less formal accounts some males older than 13 are referred to as 'boys' or 'lads' and we may suppose that these terms were applied to all males who had not completed their apprenticeship.<sup>50</sup>

Interestingly, although the term 'girl' may have been used for an unmarried female in her non-work roles, the term 'woman' or 'young woman' seems always to have been used for ragcutters, sally finishers, burlers and, later, for female powerloom weavers, even though the great majority of these were young and unmarried.<sup>51</sup> This does seem to reflect a recognition of the importance of the jobs carried out by such female workers.

Nevertheless, the influence of non-work, domestic and consumer roles on the pay of women and young persons is evidenced in the fact that evaluations of consumer need correlate highly with the observed pay levels of such people. Estimates of personal needs have been made by many analysts, for example, in the poverty inquiries of Booth and Rowntree in the late nineteenth century. Such scales of consumption needs have been used regularly since, in studies of household income, and a useful review of some of the assumptions and methods used in such adult equivalence scales has been made by Atkinson.<sup>52</sup> While such scales are best considered as relative measures and not ones of absolute poverty or need, and while the budgets upon which they are based allow for many

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<sup>50</sup>The term 'boy' can be found in Bremner, Industries of Scotland, pp. 160-161, 165-166; and in Cowan, Reminiscences p. 67; and in New Statistical Account, Penicuik Parish, p. 45.

<sup>51</sup>The term 'woman' is used in Encyclopedia Britannica under 'Paper' (1817 and 1859); Bremner, op. cit., pp. 168-169 and p. 330.

<sup>52</sup>Atkinson, Economics of Inequality, pp. 42-43.

culturally specific and arbitrary elements, the resulting scales tend in general to agree and they provide a useful measure of the relative status of various household members in terms of their consumption needs.

The adult equivalence scale of personal need used in this study is that of Foster, which is derived from the poverty survey studies of Bowley.<sup>53</sup> When we use such a scale to look at the needs of a girl aged 14 to 16 years, a woman of 21 years and above, and a lad aged 14 to 18 years, we find that their needs were respectively 0.7, 0.8 and 0.85 (where an adult man =1.0). The wage book of the woollen firm before mechanization (1851) reveals the following mean wages for each (on the labourer wage scale) as 0.5, 0.7 and 0.81, showing a virtually perfect positive correlation between pay and subsistence needs for those not adult males.

In this chapter we have seen the legacies of two traditions upon the relationship between reward and place in the division of labour. Firstly, it was suggested that the craft tradition of the highly paid artisans depended not upon a simple notion of skill, but on the contrary, upon a complex phenomenon which may be called 'craft skill.' The price of such artisan labour, that is, its reward, was not therefore simply the result of an evaluation of a role, but was, on the contrary, based upon the exercise of power and restrictive practices that produced the very definition of the role itself. It was this power over job definition which created for the artisan a special place in the division of labour and the process of production. The concept of 'skill' may therefore be seen as an ex post facto rationalization of an established position,

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<sup>53</sup>J. Foster, Class Struggle and the Industrial Revolution (1974), appendix 1, p. 256.

which seized upon but one element amongst many in the artisan work role. More details of the artisan labour process will be given in chapter 4.

The other main tradition which we have suggested had a crucial influence upon reward, and the allocation of work was that of domestic economy in its impact on women and young persons. The continued influence of the domestic sphere upon work in the period of 'manufacture' properly called, suggests that production and consumption were far from totally separate at this stage. The older form of domestic production influenced not only the allocation of work roles but also, as we shall see later, the number and proportions of family members employed. Finally, women and children's labour appears to have been evaluated not in terms of the content of their work tasks in production, but rather in proportion to their consumer needs. The impact of this fact of cheap labour was to be seen in the subsequent redivision of labour and the consequent reopening of the process of evaluation of labour power.



#### CHAPTER 4: THE EXPERIENCE OF MECHANIZATION

The mechanization of the main production processes in the woollen and paper firms involved a transition from one social form to another, and this study will attempt to emphasize the role of human action in bringing about such change. We shall be concerned with identifying the goals and interests of the parties involved and to suggest the conflicts and compromises that produced the specific outcome.

The idea of decision making and the exercise of choice amongst a number of alternatives, presupposes a voluntaristic model of human behaviour.<sup>1</sup> The relationship of such a model of human beings to social change was summarized by Marx in the apparent paradox that 'Men make their own history, but they do not make it just as they please; they do not make it under circumstances chosen by themselves, but under circumstances directly encountered, given and transmitted from the past.'<sup>2</sup> People do have an element of choice but it is not total; social forces do influence people's behaviour, but neither is this control total: in this way Marx draws a balance between the two forces, and leaves open to specific investigation, the precise conditions under which one or other will prevail. It is thus clear that the problem of 'social action', as distinct from the

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<sup>1</sup>The distinction between 'voluntarism' and 'behaviourism' is clearly made by T. Parsons, The Structure of Social Action (1949). This study will not, however, adopt the Parsonian 'action frame of reference' -for an interesting critique of Parsons see J. O'Neill, "The Hobbesian Problem in Marx and Parsons," in Sociology as a Skin Trade (1972), pp. 177-208. The Parsonian approach does have the merit of stressing the importance of subjectivity and choice in avoiding a methodological total determinism of human behaviour.

<sup>2</sup>K. Marx, The Holy Family, quoted in D. McLellan, The Thought of Karl Marx (1971), p. 125.



structural determination of behaviour, is the problem of the 'making of history.' It is precisely this crucial social area which Poggi has identified as the 'privilege of access to social action.'<sup>3</sup> This study of the changes in the division of labour is an attempt to identify some of these conditions of action and social determination and thereby to try and see who it is who 'makes history.'<sup>4</sup>

In contradistinction to forms of determinism, whether technological or otherwise, this study will argue that control or power over the division of labour is power over the stratifying criteria identified in chapter 3, such as the age and sexual category of labour and the 'skill' content of specific jobs. And that therefore when this power is exercised it constitutes a highly important case of social action influencing the historical development of social structure.<sup>5</sup>

Following the usual pattern of industrial studies, the main distinction in terms of power and social action will be drawn between management and the rest who can best be included under the

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<sup>3</sup>G. Poggi, Images of Society (1972).

<sup>4</sup>This does not mean making history in the sense of being famous - such an approach received considerable attention from historians as the problem of the individual in history, see for example G. V. Plekhanov, The Role of the Individual in History, (1940). This approach considered the role of the 'great individual' in history, the Napoleon or the Lenin. By contrast, the approach adopted in this study is concerned with less famous and often anonymous individuals. In this context, it should be noted that the 'new social history' that deals with common people, often from population listing, frequently treats these individuals passively and not as actors in history.

<sup>5</sup>The concept of power used here is close to that developed by S. Lukes, Power (1974).

economic category of labour.<sup>6</sup> It will be argued that power is exercised in pursuit of perceived 'interests',<sup>7</sup> and that these tend to polarize around the two main categories, so that the representatives of capital and labour become the main actors in this social action. There remains considerable scope for variation in the perception of these 'interests', from the most generally conceived to the most narrowly sectional. Nor is it necessarily true that these two sets of interest must conflict, but where they do conflict over a major issue, we have all the elements of a case to exemplify the conflict theory of stratification.<sup>8</sup>

In such areas as the law, micro-economic theory, and business studies, the agents of management are assumed to have control over the production process and thereby over the division of labour as well. While this is certainly the prevailing condition in most circumstances and will be assumed to be the practical determinant in

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<sup>6</sup>This distinction is common to a number of approaches, for example R. Bendix, Work and Authority in Industry (1956); S. Pollard, The Genesis of Modern Management (1965); and H. Braverman, Labour and Monopoly Capital (1974). There are a number of problems with this dichotomy. On the management side there is the question of divisions between management and owners in 'pluralist' literature on the modern period. However, the nineteenth century mill was typically owned by an owner-manager and the separation of these functions did not exist. This gives a certain anachronism to the use of the term 'management', but this term is retained because of the comparability that it affords with later studies. On the labour side there is the question of division amongst employees, for example from shareholding in the firm - again, the firms in this study were family owned not public companies and for this period the problem cannot be said to exist.

<sup>7</sup>See Lukes, Power, for the relationship between 'power' and 'interest'.

<sup>8</sup>It is under certain economic circumstance, for example, possible for both capital and labour to find common interests where these are narrowly considered and excess costs can be passed on to the consumer. A conflict theory of stratification is given by R. Dahrendorf, Class and Class Conflict in Industrial Society (1959).

default of others, it is interesting to see the extent to which management is subject to limitations and constraints. Some of these problems have been identified by studies of management during industrialization by Pollard and by Bendix,<sup>9</sup> and by the economic histories which focus on the problems of the expansion of the economy.<sup>10</sup> In this study, attention will be focused on the potentially conflicting aims of management, and the opposition they faced from the workplace and domestic organization of labour.

We can begin by suggesting some reasons why the managers of the paper and woollen firms wanted to mechanize and to replace their hand paper makers and their handloom weavers. As we have seen in chapter 3, these artisans held an important position in the labour process of pre-mechanized production. There is a sense, of course, in which the most trivial operation, if it is required for the completion of the product, can be described as necessary and is therefore a potential bottleneck preventing the expansion of production. However, the vat paper makers and the handloom weavers were responsible for a particularly large set of tasks that involved a major change in the product. It may be suggested that it was from this position in the labour process that both groups of workers derived their power, and for this reason, management singled them out for replacement by machinery when this proved possible.

In the case of the paper vat crew, the team not only made the sheets of paper from the wet pulp, but also, when a 'post' of

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<sup>9</sup>Pollard, The Genesis of Modern Management; and Bendix, Work and Authority in Industry.

<sup>10</sup>For example, the title of Gulvin's chapter 4 "The Means of Expansion after 1830" exemplifies this approach, C. Gulvin, The Tweedmakers: A History of the Scottish Fancy Woollen Industry 1600-1914 (1973), pp. 100-132.

paper had been built up, they all moved to the press and squeezed the water out of that pile of paper.<sup>11</sup> As a result, paper production stopped every half hour or so, which from the worker's point of view, provided a desirable break from the hard work. But from the management point of view the work process contained a great deal of what Palloix calls 'porosity,' that is to say, the practical tasks done extended over a wide range of activities and there remained a great deal of scope for intensification of the workers' activities.<sup>12</sup> It was from this powerful position in the division of labour that the vatmen derived their significance and which led Bremner to assert that 'the vatmen were regarded as the most important persons connected with a paper mill.'<sup>13</sup>

In a similar fashion, the hand weavers held an extensive role in the process of production of woollen cloth. The domestic weavers described by Lawson in Yorkshire had the most extreme form of extensive and varied work tasks, as distinct from a narrow range of tasks performed intensively. Thus weavers not only warped their own looms and wove the cloth, but then also sized the webs of cloth, dried them and carried them to the merchant who paid them and supplied yarn for the next piece of cloth.<sup>14</sup> A considerably narrower range of tasks was carried out by the loomshop weavers of the Borders woollen firm of this study. While such non-domestic weavers

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<sup>11</sup>See job descriptions cited in chapter 3, p. 35, especially C. Cowan, Reminiscences (1878), pp. 67-68.

<sup>12</sup>C. Palloix, "The Labour Process: From Fordism to Neo-Fordism," in C. S. E., The Labour Process and Class Strategies (1976), p. 49.

<sup>13</sup>D. Bremner, The Industries of Scotland (1868), p. 326.

<sup>14</sup>J. Lawson, Progress In Pudsey (1887), letter 7, in K. G. Ponting (ed.), Baines's Account of the Woollen Manufacture of England (1970).

concentrated on weaving, most of the warping was done by a full-time warper who was also higher paid (see table 3.3, pp. 30-31). Yet over 10 percent of the handloom weaver's time was spent on such activities as pattern weaving and warping.<sup>15</sup> The importance of the Galashiels weavers is shown in that they had their own corporate legal identity, the Weavers Corporation.<sup>16</sup>

The cost to the firms of such artisan labour is shown in table 4.1, where it can be seen that the cost of weavers was nearly half the total wage bill of the woollen firm. Excluding the youths who were assistants, the vatmen and couchers alone comprised over a quarter of the total wage bill of the paper firm. The significance of such costs is both in their influence upon the profitability of the firm and in their contribution to the support of the households in the locality. Details of the former will be considered in chapter 5 when the mechanized production process is compared with that of the artisans, and the latter will be presented in chapter 6 in the study of family economy.

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<sup>15</sup>Details were written in the Ballantyne wage books.

<sup>16</sup>See R. Hall, History of Galashiels (1898).

TABLE 4.1: VARIOUS STATISTICS SHOWING THE IMPORTANCE TO THE FIRM OF SELECTED ARTISAN OCCUPATIONS BEFORE MECHANIZATION: HANDLOOM WEAVERS IN BALLANTYNE'S 1851, AND VATMEN AND COUCHERS IN COWAN'S 1810.

	Percentage of Total Work Force		Percentage of all Adult Males		Percentage of Total Wage Cost
	%	(n)	%	(n)	%
<u>Paper</u> Vatmen & Couchers (n=100%)	13	(15)	41	(15)	27
		(n=120)		(n=37)	
<u>Wool</u> Weavers (n=100%)	34	(28)	60	(24)	48
		(n=82)		(n=40)	

Source: Wage books Cowans 1810, Ballantynes 1851.

From the point of view of the managers, these labour costs were relevant in connection with productivity, and it was in this respect that most studies of mechanization have contrasted artisans and machinery. Thus Thomson in his study of the mechanization of the paper industry in Scotland restates the claim of the manufacturers of the papermaking machine that it had seven times greater capacity than a paper vat. Similarly, he states that paper manufacturers were troubled by strikes, although he admits that there is no evidence of this in the wage books of Cowans.<sup>17</sup> However it does seem probable that the vatcrews had the kind of power to decide their own working speed as described by Bremner:

'...so independent were the workmen of fifty years ago (i.e. 1819) that it is stated to have been no unusual thing for a vat's crew, or even all the vat's crews in a mill, to stop working when they thought proper, adjourn to the nearest public-house and there enjoy themselves for such time as it suited their tastes, no matter how pressing the demand for paper.'<sup>18</sup>

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<sup>17</sup>A. G. Thomson, The Paper Industry in Scotland, 1590-1861 (1974).

<sup>18</sup>Bremner, Industries of Scotland, p. 326.



Bremner makes it clear that it was this kind of power held by the artisan workers which prompted the mill owners to mechanize as soon as they could.

Despite the fact that the weavers commanded lower wages than the vat crew, they appear to have had a similar power to control the speed, intensity and rhythm of their work. Hall describes the days before mechanization as follows:

'In those days there was no lodge erected at the mill gates, no fines for being late in the morning or at meal times, and the weavers, in particular, came and went at such times as suited their convenience. The wages were paid monthly, on Saturday afternoon, and the Monday following was by a number of weavers usually devoted to the worship of Bacchus.'

In the same vein, Hall describes the weavers going off to fish in the Tweed and the female workers making the rounds of the draper's shops, both during working hours.<sup>19</sup>

The significance of such irregular timekeeping by these workers was not only in the fact that it reduced total output, or even in the fact that it tied up circulating capital, but that the control which these artisans exercised over the production process, prevented many kinds of intensification and cheapening of labour that were not related directly to machinery.

The issue at stake here was control over the labour process: was such control to be exercised according to the tastes and convenience of the workers, or was work to be conducted according to the requirements of the owners of capital?

It is at the point in time when the decision to mechanize was made, that we can see some of the factors influencing the two

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<sup>19</sup>Hall, History of Galashiels, pp. 358-359.



historical actors, capital and labour. In contradistinction to deterministic theories which tend to remove human agency from the making of history, that is, from the development of society as a whole, this study will stress human decision making, action and conflict. Deterministic theories of change can be found in both sociological and historical literature, the former often stressing a kind of technological determinism in which only one form of social relations is possible with advanced productive technology.<sup>20</sup> Equally, historians have often accepted an atheoretical empiricism which treats the actual events as the inevitable ones, thereby removing from history the 'counterfactuals' and empathizing with history's victors.<sup>21</sup>

That management was not acting under a universal technological imperative has been stressed by the literature which has recently revived concern with the meaning of technological change. An important essay is that of Marglin, which argues that machinery was introduced not because it was more productive but in order to introduce a hierarchical mode of control by capital over labour.<sup>22</sup> In greater analytical detail but reaching the same conclusion, the Brighton Labour Process Group uses the distinction drawn by Marx, in

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<sup>20</sup>For example, see C. Kerr et al., Industrialism and Industrial Man (1960), who talk of 'the inevitable and eternal separation of industrial men into managers and managed.'

<sup>21</sup>Lukes, Power, p. 46, stresses the importance of the 'identification of the relevant counterfactual,' And in a different way the same point is made by H. Medick, 'The Proto-industrial Family Economy: the Structural Function of Household and Family During the Transition from Peasant Society to Industrial Capitalism,' in Social History, no. 3 (1976), pp. 314-315.

<sup>22</sup>S. A. Marglin, 'What Do Bosses Do? The Origins and Functions of Hierarchy in Capitalist Production,' in A. Gorz (ed.), The Division of Labour: Labour Process and Class Struggle in Modern Capitalism (1976), pp. 13-54.

the sixth chapter of "Capital," between the mere formal and legal subordination of labour on the one hand, and the 'real subordination' achieved by capital through the gaining of control over the immediate production process. This they identify as the key change in the transition from artisan 'manufacture' to capitalistic 'machinofacture.'<sup>23</sup> The detail with which this essay analyses the often conflicting tendencies inherent in this transition makes the Brighton Labour Process Group's analysis a useful guide throughout this empirical study.

An earlier technical improvement in woollen weaving provides an interesting illustration of the possibility of alternative methods than those of capitalist management for financing and introducing technological development. In the late 1780's the introduction of the fly-shuttle and the consequent need to use metal reeds was an important change in the machinery of production, and it was beyond the capacity of the weavers to pay for this new technical investment. A solution was found through the financing of this new technology by an investment grant paid to the weavers from a central funding body in the capital city.<sup>24</sup> Six decades later, it was indicative of how much the social relations of production had changed that it was not proposed to make the new investment in power looms in the same manner.

Neither can the workers be considered to have had no option but to accept the introduction of new machinery upon terms set by management. In countering the idea that machinery was an independent and inescapable force transforming the labour process, Samuel shows,

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<sup>23</sup>Brighton Labour Process Group, "The Production Process of Capital and the Capitalist Labour Process," in Capital and Class, no. 1 (1977).

<sup>24</sup>Hall, History of Galashiels, pp. 287-289; and Gulvin, Tweedmakers, p. 62.

by many examples, the effectiveness of labour in delaying and preventing certain introductions of machinery, and shows that opposition to machinery was endemic in the nineteenth century.<sup>25</sup>

Thus, if the question is asked as to whether it was futile for the vat workers or the hand weavers to resist the introduction of machines, the example of the Scottish printing compositors, being one amongst many, should be sufficient to suggest that the answer was negative. Gillespie describes how the compositors delayed for decades the introduction of various composing machines, and she suggests that these printing workers learnt from the example of earlier mechanization conflicts.<sup>26</sup>

The fact that machines were introduced into both firms must be counted as a defeat for labour, for a number of reasons as we shall see, but most immediately because the workers involved opposed this introduction and therefore, presumably perceived the presence of such machinery as conflicting with their interests. This leads to a second important point: the fact of opposition suggests that a conflict theory of stratification, not one based on cultural values or on technological determinism, is needed to explain the new inequalities that resulted from mechanization. And thirdly, the gains and losses in this conflicting action can be seen in their short term effect upon the careers of those individuals involved, and in the longer term, in the labour process and subsistence structure that resulted. The former is the problem of the career opportunities or technological unemployment created by

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<sup>25</sup>R. Samuel, "Workshop of the World: Steam Power and Hand Technology in Mid-Victorian Britain," in History Workshop (1977).

<sup>26</sup>S. C. Gillespie, A Hundred Years of Progress: Records of the Scottish Typographical Association (1953).

industrialization; the latter is the problem of the origins of the new work and class structure of industrial society.

In order to study these problems, this chapter will be concerned with individual careers; chapter 5 will consider the new structuring of the work process; and household and class composition will be discussed in chapter 6. Thus it can be seen that the whole of this thesis is an extended attempt to assess the gains and losses of mechanization, distinguishing the various sectors of social life in which they occurred and identifying the parties to whom they accrued.

The chronologies of the introduction of machines reveals an interesting similarity in both firms: machinery was introduced after production had received a major disruption for some other reason. Thus in the case of the paper firm, the mill was closed and used as a prisoner of war camp and barracks during the Napoleonic Wars and was repurchased by its former owner in 1818. It was after this disruption that the paper machine was introduced, the machine being erected by 1821.<sup>27</sup> In a similar manner, the woollen firm moved from the town of Galashiels to found the factory village of Walkerburn during the years of 1857 and 1858, and the first powerlooms were set up in the new mill at this removed location.<sup>28</sup> The possible advantages of mechanizing when a dislocation might disrupt potential opposition, suggests that the connection of these two events was not coincidental. A similar change of factory site is noted by Scott as

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<sup>27</sup>J. J. Wilson, The Annals of Penicuik: Being a History of the Parish and of the Village (1891), pp. 121-122.

<sup>28</sup>T. Dobson, Reminiscences of Innerleithen and Traquair (1896), pp. 167-169. The precise chronology of the woollen mill's move can be determined from the Ballantyne wage books.

preceding the introduction of the glassblowing machine at Carmaux.<sup>29</sup>

It is possible that the 'illuminations' and 'general rejoicing' in the village of Penicuik that greeted the reopening of the paper mill<sup>30</sup> reduced the opposition to the fact that it was to re-open with a machine as well as vats. However, this rejoicing did not last long, because the paper workers' fears concerning the new machine resulted in the organization of a strike against its use at Cowan's mill. Niven wrote of these events as they happened:

'The paper makers, I fear, will be hurt by this new invention, - the consequence is already felt - their wages are reduced, - and at present there is a general outstand here.'<sup>31</sup>

The paper workers' opposition was overt and direct. They may have delayed the commencement of machine operation for a number of months, but the result was a defeat for the workers. Machine paper began to be made, and in fact, in the Scottish paper industry as a whole, mechanization was 'extremely rapid,' at least in comparison with the English branch of the industry.<sup>32</sup>

In the woollen firm the conflict between the handloom weavers and the mill managers took a different form. The weavers' strategy was to defend their piece rates, and this they did in the only major strike of the Galashiels woollen industry which occurred in 1849. This was undoubtedly a rearguard action by the weavers to stop the bosses cutting the piece rates during a recession in the industry,

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<sup>29</sup>J. W. Scott, The Glassworkers of Carmaux: French Craftsmen and Political Action in a Nineteenth Century City (1974).

<sup>30</sup>Wilson, Annals of Penicuik p. 122.

<sup>31</sup>J. Niven, A Narrative of the Village and Parish of Pennicuik, or Reflections on the Days of Youth (1824), p.9.

<sup>32</sup>D. C. Coleman, The British Paper Industry, 1495-1860 (1958), p. 293.

and in this they were partially successful. Hall concluded that the result was a balance between the two sides; '...in the coarser kinds of work the weaver gained an advantage, while in regard to finer goods the benefit lay on the side of the employer.'<sup>33</sup> However, in the long term their strategy must be said to have been pursued very effectively, for as late as 1868 their piece rates had not been cut at all.<sup>34</sup> In this respect, the experience of the woollen handloom weavers regarding mechanization was in marked contrast with that of the cotton handloom weavers.<sup>35</sup>

While the results of the weavers' successful defence of their wages were clear, their relationship to the operation of the new powerlooms was more ambiguous. Bremner's account seems implausible, relying as it does on 'prejudice' on the part of the weavers and making no reference to the rational strategies of resistance to the loss of their jobs and way of life that was involved:

'The handloom weavers had a strong prejudice against the powerlooms, and would not relinquish their old-fashioned machines and go to work on the new; hence females were set to do the work. Ultimately the men came to think that they should overcome their prejudices, and many of them would fain take charge of the powerlooms; but the women having got possession, determined to keep it and minding a powerloom is now regarded as a woman's and a womanly occupation.'<sup>36</sup>

Gulvin considers it more probable that powerlooms were eased in piecemeal during the economic boom of the 1850's when there was

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<sup>33</sup>Hall, History of Galashiels, pp. 357-358.

<sup>34</sup>Bremner, Industries of Scotland, p. 167.

<sup>35</sup>See B. P. R. Gaskin, "The Decline of the Handloom Weaving Industry in Scotland During the Years 1815-1845," (Ph.D. thesis Edinburgh, 1955).

<sup>36</sup>Bremner, Industries of Scotland, pp. 168-169.



plenty of work to go round.<sup>37</sup> It seems likely that male weavers were never seriously given the option of operating the new powerlooms. According to the wage books, Ballantyne's own powerlooms were operated exclusively by women from the very first.

Thus it is an apparent paradox that although the weavers succeeded in their strategy of opposition to mechanization and the paper workers lost in theirs, it was in the long term the paper makers who secured the stronger bargaining position. This they did by securing a form of transition for at least some of the hand producing artisans to the new machines. Details of these transition rates will be given below in relation to the careers of artisans in this period. The important point in terms of strategy is that the paper workers continued to be placed at the centre of the process of production by working the new machines, whereas the weavers, through their inability to operate the new machines, found themselves increasingly marginalized. The result was that the paper workers had the chance to 'fight again another day,' albeit in smaller ways, whereas the problems and issues of woollen weaving were consigned to another social category of people.

In opposing the introduction of machines the artisan workers were in effect resisting one further step in the process of their proletarianization. There were, of course, many different aspects to this process, and many commentators have argued that not all the consequences were bad. The more immediate results of the defeat of the artisans over the issue of mechanization, can be considered in terms of the distinctions conventionally drawn in mobility studies between intra- and intergenerational mobility of individuals on the

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<sup>37</sup>Gulvin, Tweedmakers, pp. 183-184.



one hand, and bloc-mobility, referring to change in the occupational structure, on the other. The study of intragenerational mobility will shed some light on the question of the deleterious effects of mechanization on the careers of artisans, in particular whether the old 'skills' of handicraft production were transferable to the new occupations of machine production. Secondly, the question of intergenerational mobility directs attention to the inheritance of occupations, and we shall attempt to see whether the sons of artisans suffered a disadvantage in life as a result of their father's occupational displacement. Finally, bloc mobility, in particular the declining status of certain occupations and changes in the occupational structure, affected the availability of jobs at different ranks and statuses, and therefore influenced the ability of these artisans and their children to maintain or improve their condition in life. All three aspects of mobility need to be considered before we can assess the impact of mechanization on the way in which the artisans and their families experienced industrialization, and the ways in which they resisted or adapted to the threat of proletarianization.

It will become clear that while these various aspects of mobility are related, they can combine with radically different effects, and it is therefore necessary to do some detailed analysis before conclusions can be reached. However, it will be argued, against the 'optimistic' interpreters of the Industrial Revolution, that there occurred not only disruption of the careers of artisans, and their technological unemployment, but also degradation of their economic status.

The first question to be addressed is whether there was in fact any dislocation of the careers of hand producing artisans.

It may be noted that the 'machinery question' was a hotly debated issue in the early and mid-nineteenth century,<sup>38</sup> and disagreements over the effect of machinery continue. On the one hand we have suggested that both the paper makers and the weavers resisted the introduction of machines and that they feared the displacement of their labour. On the other hand, economic historians who have focused on the expansion of the economy as a whole have argued that the displacement of labour by machinery was nonexistent or insignificantly small. An example of such reasoning comes from Hartwell who claims that 'much new plant was an addition to total plant, not a displacement of existing plant' and that as a result there was no reduction in demand for labour.<sup>39</sup>

It will be shown that within the firms of this study new machinery did result in the loss of jobs previously done by hand-tool workers. The wider question of the total demand for labour will be considered subsequently in relation to the quality and kind of labour employed. But it may be noted that Hartwell's contention that total demand for labour rose, and hence there was no impact on careers, <sup>implies that</sup> there was only one quality of labour employed and a single labour market.

The number of jobs lost shows a clear pattern of decline both in absolute and relative numbers, as shown in table 4.2. In the paper firm the number of jobs fell dramatically after 1821 when the paper making machine was introduced, falling from five vats to one vat capacity during the decade. There were two vats in 1841,

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<sup>38</sup>Samuel, "Workshop of the World," in History Workshop (1977), pp. 7-16; and M. Berg "Mills of the Millennium," (unpublished, 1977).

<sup>39</sup>R. M. Hartwell, "The Rising Standard of Living in England, 1800-1850," in Economic History Review, 2nd. ser., vol. 13 (1960-61), p. 400.

but both were stopped soon thereafter. In this firm the rapid and decisive abolition of hand production jobs fits the pattern of the Scottish paper industry as a whole. The situation in the woollen firm was different in that the number of weavers was expanding rapidly up to the eve of mechanization. Numbers of these hand producers reached a maximum of 53, or 42 percent of the work force, in the year 1857. The fall in numbers with the introduction of machines was dramatic, but less final than in the case of paper because a certain amount of hand weaving was retained through 1881 and beyond.<sup>40</sup>

TABLE 4.2: NUMBERS OF SELECTED ARTISAN JOBS AND PERCENTAGE OF TOTAL WORK FORCE IN TWO FIRMS DURING MECHANIZATION: HANDLOOM WEAVERS IN BALLANTYNE'S, 1851 TO 1871, AND VATMEN AND COUCHERS IN COWAN'S, 1801 TO 1851.

Wool Handloom Weavers*			Paper Vatmen and Couchers		
Date	Weaver Jobs N	Percentage of Work Force % (N=100%)	Date	Vatmen & Coucher Jobs N	Percentage of Work Force % (N=100%)
			1801	8	12 (66)
1851	28	34 (82)	1810	14	12 (120)
1857	53	42 (127)	1821	10	11 (92)
1861	18	14 (126)	1831	2	1 (178)
1871	14	5 (274)	1841	4	1 (300)
			1851	0	0 (392)

Source: Wage books, Ballantyne's 1851 to 1871, and Cowan's 1801 to 1851.

Notes: \* Weavers here includes apprentices.

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<sup>40</sup>See chapter 5, page 127 for details of weavers in 1881. Gulvin suggests that these weavers were retained to do the more intricate work or short runs that were less economical on the power loom, Tweedmakers, p. 168.

It can be concluded from the events in both firms that the theory that new machinery did not involve loss of jobs is incorrect. The effect that this abolition of positions had on the careers of handicraftsmen can be seen by the extent to which such artisans were forced to leave their jobs. This could happen in two different ways: either the artisan was 'sacked' and forced to leave the firm, or he was re-employed on new work inside the firm. Both these cases must be taken together to assess the impact of machinery on careers since both effectively disrupted artisan conditions of employment. However, their outcome in terms of status change for the artisans was varied, and, equally importantly, different research methods and sources must be utilized to shed light on these contrasting experiences inside and outside the firm.

The practical problem of estimating, first of all, the sacking rate is made harder by the fact that there was a certain amount of voluntary turnover of employees. Such turnover mitigated the effect on individuals of the abolition of artisan positions, at least in the short term. But it did not, of course, lessen the effective reduction of employment opportunities for these artisans in the long term.

In the paper mill, the decade of greatest impact of machinery on jobs was between 1821 and 1831, as can be seen from table 4.2. The normal turnover rate for such highly skilled men as vatmen and couchers was very low, these workers having a labour stability index

of over 90 percent per year, and of 70 percent over a decade.<sup>41</sup> (See table 4.3.) In other words, 70 percent of these top paper workers had more than ten years experience in the same firm before the introduction of machines, and from this we should expect to find the persistence rate during the next few years to be equally high.

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<sup>41</sup>The annual labour stability index is defined as the number of employees with one year or more previous employment in the firm, divided by the total number of employees in the firm at the end of the period. For discussion of the relative merits of this index and the labour turnover index see I. R. Anderson, "A Study of a Firm's Labour Turnover Problem: Its Causes, Effects and Some Attempted Solutions," M.Sc. thesis, University of Edinburgh (1970).

TABLE 4.3: LABOUR TURNOVER: PERCENTAGE OF EMPLOYEES IN SELECTED ARTISAN OCCUPATIONS WITH X YEARS EMPLOYMENT EXPERIENCE INSIDE TWO FIRMS: HANDLOOM WEAVERS IN BALLANTYNE'S 1851 TO 1856, AND VATMEN AND COUCHERS IN COWAN'S 1801 TO 1821.

<u>Wool</u>			<u>Paper</u>		
Handloom Weavers			Vatmen and Couchers		
	Percentage of Employees With X Years of Subsequent Employment in the Firm			Percentage of Employees with X Years of Previous Employment in the Firm	
	%	(n)		%	(n)
Base year =1851	..	(28)	Base year =1821	..	(10)
More than 1 year	79	(22)	More than 2 years	90	(9)
More than 2 years	68	(19)	More than 10 years	70	(7)
More than 6 years	29	(7)	More than 20 years	10	(1)

Source: Wage books, Ballantyne's 1851 to 1856, and Cowan's 1801 to 1821.

Note: Ballantyne's weavers' service rates could only be calculated for six years before the disruptive effects of mechanization and relocation occurred in 1858 - see below chapter 4. Neither can decennial service rates be calculated for this firm before 1851 since Ballantyne's wage books begin in 1846.

Since the expected loss of skilled paper workers through turnover was no more than one in ten during two years, we can reasonably infer that **out of** four who departed from the firm at least three were sacked. Leaving aside for the moment the kinds of jobs taken by these displaced artisans, we can suggest that mechanization resulted in the sacking of about a third of the skilled, hand paper makers.

In the woollen firm, the handloom weavers had a higher rate of turnover than the vatmen and couchers of the paper trade.

Ballantyne's weavers in 1851 had a labour stability index of 79

percent over one year and of 48 percent over three years. The complicating factor in the case of Ballantyne's mechanization was the fact that the business was moved away from Galashiels to the village of Walkerburn, ten miles away, in the year between 1857 and 1858. There were thus three sources of loss of workers to the firm: firstly, the usual rate of labour turnover; secondly, unwillingness to make the move to the new location of the mill; and thirdly, unemployment caused by the introduction of powerlooms.

The rapid expansion of Ballantyne's hand weaving meant that the number of hand weavers rose from 28 in 1851 to 53 in October 1857, just before the move to Walkerburn began. At the end of the year, that is in October 1858, only ten out of the original 53 weavers were still employed by the firm, this being a reduction of 88 percent. In order to estimate how many of these were actually sacked, we must try and remove the effects of the other factors described above, and the procedure used is outlined in table 4.4.

TABLE 4.4: METHOD OF CALCULATION OF WEAVER SACKING RATE, BALLANTYNE'S 1857 TO 1858.

Step 1. Obtain Non-weaver Transfer Rate.\* This is the observed transfer rate minus turnover at 21 percent per annum.

$(74 - 15.54) = 58.46$  = Expected number of non-weavers transferring.

Actual number of non-weavers transferring = 36.00.

Difference (expected minus actual) =  $(58.46 - 36.00) = 22.46$

= 30 percent (of 74 cases.)

Step 2. Obtain Weaver Expected Transfer Rate. Expected transfer rate is total number of weavers (53), minus turnover at 21 percent (= 11.13), and minus 30 percent not wanting to <sup>transfer to</sup> the new village (= 15.9). Expected transfer rate  $(53 - [11.13 + 15.9]) = \underline{25.97}$



TABLE 4.4 - Continued

Step 3. Compare Expected with Observed Transfer Rate to Get Rate of Sacking. Observed transfer rate = 10 weavers.

Sacking rate (expected minus actual) is  $25.97 - 10.00 = \underline{15.97}$   
= 30 Percent (of 53 cases.)

Note: (\*) This assumes a zero non-weaver sacking rate, which is a reasonable assumption since other workers were not threatened by mechanization at this time.

Using the transfer rate of non-weavers to estimate the extent of unwillingness to make the move the Walkerburn, and allowing for the usual rate of turnover during a one year period, we still find that about 30 percent of Ballantyne's weavers were made involuntarily redundant.<sup>42</sup>

We must conclude that in both the woollen and the paper firms there was a sacking rate of about 30 percent of those involved in the old production processes that were subject to mechanization. For this reason we must reject the claim of Hartwell that new machinery did not cause unemployment. Of course, we cannot show that there was any adverse effect on the individuals concerned, until we have examined the kinds of alternative employment that were available to them, and this will be the subject of the next section. Such a sacking rate does reveal that mechanization did not take place without a major dislocation of the careers of an important section of the work force.

Whether the workers in the cohort of jobs affected by

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<sup>42</sup>There is no reason to think that the family commitments of the weavers would have made them more unwilling to move to the new location than other workers. Indeed, because they were more often main earners they may have had less financial disincentive to movement.

mechanization were better or worse off as a result, depended upon a number of factors. Clearly, the experience of being "sacked" was important, but its results depended upon the opportunities outside the firm, while those who remained in the firm may have had differing experiences therein.

A look at the extent of re-employment inside the firm suggests that the disruption of artisan careers which resulted from machinery extended beyond those who were actually sacked. Table 4.5 shows that in the paper firm only one man continued at the same artisan job during the decade of mechanization, while a further five were re-employed on different work. If we add to the one man in ten still a hand producer, the one other man whose absence was attributed to natural turnover, we can conclude that only 20 percent of artisans were unaffected by the introduction of machines. The much lower rate of persistence in the woollen firm suggests that the careers of handloom weavers outside the firm must be examined. However, the presence of only a single weaver who continued at the same handicraft job throughout the decade suggests the same conclusion as in the paper firm: the great majority of artisans were profoundly affected by mechanization.

TABLE 4.5: INTRAGENERATIONAL MOBILITY: CAREERS OF SELECTED ARTISANS INSIDE TWO FIRMS DURING THE DECADE OF MECHANIZATION: HANDLOOM WEAVERS IN BALLANTYNE'S 1851 TO 1861, AND VATMEN AND COUCHERS IN COWAN'S 1821 TO 1831.

		Wool 1851-61	Paper 1821-31
		% (n)	% (n)
Same Job; Not affected		4 (1)	10 (1)
Re-employed Inside the Firm	Higher Pay	7 (2)	- (")
	Lower Pay	4 (1)	50 (5)
Departed From the Firm	Sacked	86 (24)	30 (3)
	Natural Turnover	10 (1)	10 (1)
		101% — (28)	100% — (10)

Source: Wage books, Ballantyne's 1851-61, Cowan's 1821-31.

Although the fact of disruption of their careers certainly caused a crisis in the lives of the majority of artisans, the qualities of the new jobs taken by these displaced workers must be examined in order to assess whether this change was for the better or the worse. The fate of the artisans in the two firms of this study provides evidence that conflicts with the influential views of Thernstrom, who claims that there was little downward social mobility during industrialization. Thernstrom writes:

'Convincing evidence that it was the skilled craftsmen of old or their children who made up the semi-skilled factory labour force has never been produced by adherents of the cataclysmic view of industrialization. Recent research suggests that status degradation was a rare phenomenon, that the skilled have commonly been able to preserve their position...'<sup>43</sup>

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<sup>43</sup>S. Thernstrom, *The Other Bostonians* (1973), p. 45; reprinted in M. Drake (ed.), *Exercises in Historical Sociology* (1973), pp. 225-226.

It may be noted firstly that Thernstrom makes use of the conventional distinction between 'skilled' artisans and 'semi-skilled' factory work. Since the analysis of artisan skill in chapter 3 has suggested that much of the force of this distinction was based upon specific social characteristics, this has important implications for the relevance of old skills to the requirements of the new work, and hence also for the ability of men with the old skills to transfer to new jobs of equal status. Secondly, the ability to find such jobs was influenced by the proportions of newly created jobs that were highly paid. As we shall see in more detail in chapter 5, there were in fact fewer high paying jobs after labour had been redivided during mechanization. Opportunities inside the firm were therefore reduced, and if these were reproduced similarly in other firms, then the only possible upward path may have been into another industrial sector. This latter problem was noted by the nineteenth century contributor to the 'machinery question' Charles Babbage, who noted in relation to the handloom weavers that the '...persons thrown out of work are not exactly of the same class as those called into employment by the powerlooms.'<sup>44</sup>

Since the paper workers had such a high rate of persistence in the firm it is relatively easy to follow their careers and see whether those with old skills found new skilled jobs or whether they became ordinary factory workers minding machines. In fact ~~out of~~ <sup>employed in 1821,</sup> the ten skilled paper artisans / five were re-employed inside the firm at the end of the decade suffering reductions of pay, and only one man still worked at the vat keeping his old high pay level (1.7 labourer wage units.) The pay cuts averaged over two shillings

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<sup>44</sup>C. Babbage, On the Economy of Machinery and Manufactures (1832), p. 339.

per week (0.22 labourer wage units) and were greater for the four men who did not get new 'skilled' jobs. One man, William Sharpe, successfully transferred from old vat hand production to operation of the new paper machine, and was the sole case of old skill transferring to new. At the most optimistic, this represents one in six of those remaining in the firm and one in ten of the whole affected by mechanization.

One problem in attempting to estimate intragenerational mobility rates for a whole cohort is that the conclusions drawn depend upon assumptions made concerning the distribution of opportunities both inside and outside the firm. If the career structure and opportunities were the same in all employments, then those staying in the firm would be representative of all workers in any cross-section in time. However, if as may have been the case, promotion prospects were concentrated in large firms like the ones in this study, then estimates of mobility based on the stayers may be over optimistic. Evidence from the Philadelphia manufacturing census for the mid-nineteenth century suggests that 'the larger the firm, the higher the wage,' with possibly greater career potential too.<sup>45</sup>

However, even the possibly over-optimistic evidence from the paper firm does not support the claim of Thernstrom and others that there was no status degradation of artisans. There is evidence of a high degree of downward mobility in the paper firm where four out of the five men forced out of handicraft work became 'semi-skilled,' that is medium paid (1.3 to 1.4 labourer wage units),

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<sup>46</sup>See B. Laurie, T. Hershberg and G. Alter, "Immigrants and Industry: The Philadelphia Experience, 1850-1800," in Journal of Social History, vol. 9, no. 2, pp. 219-248.

machine minders and took a substantial loss of pay in the process. Even the machineman's job, which was the highest paid mechanized job (1.6 times the labourer wage) involved a cut in wages for the one artisan who made the transfer. For all these workers there was an intensification of work and discipline that contrasted strongly with their previous work experience. Hence it can be concluded that this form of proletarianization was the fate of at least 50 percent of the cohort of artisans who experienced mechanization, with the proportion being probably much higher depending upon the experience of those who were sacked and left the firm.<sup>46</sup>

This inability of the hand producers to transfer their 'skills' to the new machine production was partly due to management's ability to recreate the labour process with less high paid jobs. But it also supports the view that so called 'artisan skills' were in fact the product only of their position in the division of labour, and that as soon as the work was redivided, management was able to remove the basis for the individual workman's 'skill.' To the extent that this artisan's skill was of this kind, it was by definition occupationally specific and hence non-transferable. It is therefore not surprising to find that in their new jobs so few of the old artisans were 'skilled' workers.

The evidence of the paper firm is that not only did skills rarely permit artisans to transfer to new skills, but also that the new factory proletariat was recruited directly from the ranks of the skilled artisans in a large proportion of cases. This at least

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<sup>46</sup> Failure to attempt an estimate of the size of the cohort affected by mechanization at the Carmaux glassworks mars the study by Scott who supports the same optimistic conclusion as Thernstrom with only descriptive and impressionistic evidence, Scott, Glassworkers of Carmaux.

appears to have been the pattern amongst those artisans who had no alternative but to work for an employer and had no chance of continuing their craft as self-employed workers. The contrasting case of the handloom weavers is therefore interesting because it reveals the personal strategies which a different kind of artisan used to cope with the challenge of technological unemployment.

Table 4.5 showed that the handloom weavers had a much higher turnover rate than the papermakers, only 14 percent remaining in the same firm during the decade of mechanization between 1851 and 1861. Of those four men remaining, only one was still a weaver at the same artisan job; two were higher paid, being a foreman and a warper; and the fourth had taken a pay cut to become a woolsorter.<sup>47</sup> It can be concluded that dislocation of the careers of weavers was severe, with under 4 percent continuing the same job in the same firm. Furthermore, since all power weaving was done by women, there was no transfer of old artisan hand producers to the new machine production in weaving. Perhaps indicative of weaver preferences was that none of the weavers in the firm worked at a mechanized job. The existence of such a preference is further supported by a study made of a group of weavers who left the firm.

It is therefore fortunate for research purposes that the woollen firm of Ballantynes re-hired some handloom weavers to work in Galashiels in the late 1850's. Such weaving work was abruptly ended in the months before the 1861 census, with the result that a unique opportunity was available to link these sacked weavers from

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<sup>47</sup> This one woolsorter was exceptionally low paid, earning only 0.77 of the labourer wage in 1861. This was probably due to particular personal characteristics, perhaps his age which was 62 years at this time.



the Ballantyne wage book to this census. The results are presented in table 4.6.

TABLE 4.6: INTRAGENERATIONAL MOBILITY: OCCUPATIONS OF EX-BALLANTYNE'S HANDLOOM WEAVERS LINKED TO CENSUS OF GALASHIELS 1861.

	%	(n)
Same Occupation (Handloom Weaver)	73	(16)
New Occupations: Same Industry and Higher Status	14	(3) (Spinner, Warper, Foreman)
Different Industry and Uncertain Status	14	(3) (Carrier, Blacksmith, Draper)
	<hr/> 101	(22)
Too many candidates for link*		(4)
Not traced**		<hr/> (7)
Total weavers in wage book		(33)

Source: Ballantyne wage book 1860-61, and census of Galashiels and Ladbroke Parishes 1861.

Notes: \* This was caused by the occurrence of common names and lack of linkage 'keys' in this sample.

\*\* Those not traced can probably be assumed to have been out-migrants from Galashiels.

In contrast with the paper artisans, the weavers, and as we shall see their sons too, appear to have resisted the proletarianization involved in entering machine-minding factory work. They seem on the contrary either to have chosen the under-employment and economic marginality of continuing their old craft or to have moved out of the woollen industry altogether and into unmechanized artisan employments. Table 4.6 shows that of dismissed weavers traced,

nearly three quarters remained in the same occupation, although by this date it was becoming clear that handloom weaving was a dying occupation. And of the others only one in six had entered a mechanized job.

This apparent loyalty to a declining occupation was made possible by the continuance of outworking by handloom weavers. While it is not possible to distinguish domestic weavers from factory loomshop weavers,<sup>48</sup> it is clear that the total number of male weavers over 21 years of age in Galashiels showed a steady decline (see table 4.7.) What is remarkable, however, is the continued high number of handloom weavers especially as late as 1871.

TABLE 4.7: NUMBER OF ADULT HANDLOOM WEAVERS, AND PERCENTAGE CHANGE IN GALASHIELS 1851 TO 1871.

<u>Year</u>	<u>Number</u>	<u>Percentage Change</u>
	N	%
1851	500*	..
1861	323	-35%
1871	262	-19%

Source: Census enumeration books of Galashiels, 1861 and 1871 - frequency count from visual inspection. (Not 1851).

Note: \* This figure is an estimate from attendance at a general strike meeting in 1849, reported in Hall, History of Galashiels, p. 357.

The under-employment of such weavers is described by Bremner as it existed in the mid-1860s:

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<sup>48</sup>Place of work was not given in the population census, so it is not possible to know if a listed handloom weaver worked in his own house or in a firm's loom shed. The Factory Inspector's returns are no help here because, being unmechanized, handloom weaving was not covered by the Factory Acts.

'...there are frequent gloomy, weary days, in which the shuttle lies at rest, and the men hang about the door with sad countenances, or saunter to the factory to ascertain what prospect there is of obtaining another job.'<sup>49</sup>

It cannot therefore be concluded that continuance in the same occupation was for handloom weavers a maintenance of their previous occupational status. For many, the choice they appear to have made, was of accepting under-employment rather than entering other work, and under these conditions such occupational continuity cannot be considered to support the 'optimistic' interpretation of Thernstrom, et al.

Neither can the bloc-mobility of weaver occupational decline be said to have been mitigated by the claim that turnover permitted a different kind of unskilled agricultural recruit to enter the occupation. This argument has been advanced for the declining years of Lancashire cotton handloom weaving by Bythell, and a similar process of new agricultural recruitment has been proposed by Thernstrom as the source of the new factory proletariat.<sup>50</sup> Evidence that this was not the situation with the woollen handloom weavers in Galashiels is presented in table 4.8 which shows that the proportion of weavers born in agricultural parishes stayed constant at about one quarter. Furthermore, the increasing average age of the weavers between 1861 and 1871 suggests that there were fewer younger recruits and that the same men may have been staying in the occupation.

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<sup>49</sup>Bremner, Industries of Scotland, p. 167.

<sup>50</sup>D. Bythell, The Handloom Weavers: A Study in the English Cotton Industry During the Industrial Revolution (1969), p. 45; Thernstrom, The Other Bostonians, p. 45.

TABLE 4.8: INDUSTRIAL CHARACTER OF PLACE OF BIRTH, AND AGE OF HANDLOOM WEAVERS: VARIOUS SAMPLES, CENSUS OF GALASHIELS 1851 TO 1871.

<u>Year</u>	<u>Industrial Character of Place of Birth</u>		<u>Average Age (in years)</u>	<u>Sample Size</u>
	<u>Agri-culture</u>	<u>Wool &amp; Textiles</u>		
	%	%	$\bar{x}$ (S.D.)	N
1851	23	60	36.2 (14.1)	52
1861	26	70	35.6 (13.2)	42
1871	25	64	42.8 (6.8)	32

Source: Manuscript census enumeration books of Galashiels, various samples: 1851 - purposive sample collected for linkage to the wage books; 1861 and 1871 - name sample collected of all male weavers, 21 years and over, who had surnames beginning with the letters C and F, and including also MacC and MacF. These name samples proved in both cases to be 13 percent of the total weaver population - see frequency count in table 4.6.

Note: The difference in mean ages in 1861 and 1871 does not prove to be statistically significant.

The study of the impact of machine technology on the careers of artisans can be concluded with a look at intergenerational mobility. Just as the careers of the artisans themselves have been the subject of conflicting interpretations between those optimists who claim that artisans were better off and, on the other hand, those who see extensive occupational decline, similarly the careers of the sons of artisans have produced disagreements along the same lines. Scott has provided some descriptive evidence to support the claim of Thernstrom that the sons of skilled artisans '...have been likely to find other skilled niches or quite often to enter a white collar position of some kind.'<sup>51</sup> On the other hand, it might seem that the inability of a father to bequeath the same occupation to his son,

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<sup>51</sup>Thernstrom, The Other Bostonians, p. 45.

a privilege that was jealously guarded by many guild traditions, might suggest disadvantages in life accrued to the sons of déclassé artisans.

An interesting source of information on occupational inheritance for the weavers and their sons comes from the marriage certificates of Galashiels.<sup>52</sup> The advantage of such certificates is that they provide large numbers of sons in their mid-twenties when their careers were established, and are not limited to the usually younger, co-resident children as are studies based on the household censuses.

Table 4.9 shows that occupational inheritance was as high as 50 percent in the late 1850's, and that it only declined as the work available contracted, indicating that a norm of occupational succession from father to son existed. The inheritance rate seems surprisingly high, for even in the late 1860's a third of all sons of handloom weavers entered that declining occupation.

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<sup>52</sup>Civil registration of marriages began in 1855, which is too late a date to permit a comparable study of the marriages of hand papermakers in Penicuik. The earlier parochial marriage registers were neither sufficiently complete nor detailed enough, with respect to occupations, to permit use of this source.

TABLE 4.9: INTERGENERATIONAL MOBILITY: OCCUPATIONS OF SONS OF WOOLLEN HANDLOOM WEAVERS, GALASHIELS 1855 TO 1871.

	<u>1855-61</u>	<u>1865-71</u>
	% (n)	% (n)
Same Occupation	50 (16)	32 (24)
Other Occupations:		
Same Industry (woollen)		
Supervisory	- "	4 (3)
High Pay	9 (3)	16 (12)
Medium Pay	16 (5)	7 (5)
Low Pay	- "	8 (6)
Other Industry		
High Status	6 (2)	- "
Artisans	9 (3)	30 (22)
Labourers	9 (3)	3 (2)
	<u>99%</u> (32)	<u>100%</u> (74)

Source: Taken from all marriages registered in Galashiels, 1855-61 and 1865-71 (total=962 marriages.)

The response of the handloom weavers and their children to the changing occupational structure produced by mechanization is shown by the sharp increase in the proportion of sons moving into artisan jobs outside the woollen industry. Table 4.9 shows that the number of handloom weavers' sons who left the industry and took non-mechanized, small scale and often self-employed artisan occupations, increased over three times, as mechanization reduced the most popular option of occupational succession. This pattern suggests that the sons of weavers followed their fathers' preference for a work place and discipline that was closer to traditional

handicraft production than to the intensity of operating a machine in a factory. In this way we can see how the individuals who experienced industrialization resisted the tendency that was forcing them into a more complete proletarianization, and this they did by taking advantage of the uneven development of capitalist 'machinofacture' in the different industrial sectors of the economy.

Those who did enter the new industrial labour force seem to have been quite successful at obtaining relatively high paid jobs such as spinner, warper and wool sorter (the latter being an occupation which rose in status over time). Such high paid jobs were taken by 16 percent of all sons in the period 1865-71 (see table 4.9.) However, the optimistic hypothesis about artisan careers is therefore fulfilled in only one fifth of the sons, and even these frequently paid the price of a faster pace of work and stricter discipline. Thernstrom's model of upward mobility does not therefore appear to fit the data in the case of the Borders woollen weavers. It is truer to say, in describing nearly two thirds of all weaver's sons, that they chose the risk of irregular employment and possibly a loss of pay in order to retain for themselves the artisan life-style with its 'on the job leisure.'

In this chapter we have seen two important groups of hand producing artisans resist mechanization, first directly in open conflict, and then indirectly in personal strategies of resistance to proletarianization. This active role of labour supports the rejection of both technological determinism which sees such machinery as inevitable, and functionalist theories of stratification which see such changes introduced without conflict. However, the success of management in mechanizing the main production process in both firms can be seen as a defeat for labour, most immediately in its



effect on the careers of artisans involved, but also as we shall see subsequently, for its effects upon the structure of work and the family.

The differing speed of mechanization in the two firms led to some differences in the experiences of the artisans involved.

In the 1830's Charles Babbage posed the problem this way:

'Whether it is more for the interest of the working classes, that improved machinery should be so perfect as to defy the competition of hand labour; and that they should thus be at once driven out of the trade by it; or be gradually forced to quit it by the slow and successive advances of the machine?'<sup>53</sup>

It seems that the Scottish Border weavers were superceded by the latter method, and the hand paper makers by the former. However, the end result was in both cases very similar, and neither can be said to have been in the interests of the working class.

What such workers lost was a major degree of control over their own working conditions. If it seems impossibly anachronistic to desire the old rhythms and time-keeping of hand production, it should be remembered that this ideal of cottage industry is still alive in the theory of small or low technology, and that the ability to stop work and go fishing on a sunny day or drink after pay day is close to Marx's description of unalienated labour.<sup>54</sup> The drudgery of hand production should <sup>not</sup> be forgotten, however. We have already noted the bad conditions under which artisans worked: the weavers were well aware of this when they called their handlooms 'the four stoops of misery,' and a weaver told the youthful Thomas Dobson

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<sup>53</sup>C. Babbage, Economy of Machinery and Manufactures, p. 336.

<sup>54</sup>See for example, D. Dickson, Alternative Technologies: The Politics of Technical Change (1974); K. Marx, The German Ideology (1845-6), in D. McLellan (ed.), The Thought of Karl Marx (1971), p. 217.

'never to be a weaver.'<sup>55</sup> However, the fact that people were willing to struggle to preserve these conditions rather than accept the leap in alienation involved in capitalistic machinofacture emphasizes the gravity of the term 'proletarian.'

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<sup>55</sup>Bremner, Industries of Scotland, p. 166; J. A. Anderson, The Cleikum: Being Interesting Reminiscences of Old Innerleithen (1937), p. 43; T. Dobson, Reminiscences of Innerleithen and Traquair (1896), p. 116.

## CHAPTER 5: THE REDIVISION OF LABOUR

In this chapter attention will be focused on the new structure of occupations that emerged during mechanization. In particular, the strategy of management will be considered in terms of its own goals and the internal conflicts these contained, together with the forms of resistance these met as a result of labour's direct action and from the deeper structural conditions under which labour lived and reproduced.

The plan of this chapter takes the following pattern. First the managerial attack on the position of the artisan craftsmen in the labour process will be considered, looking at the way in which labour was redivided in the two main production processes, weaving and paper making. The guiding theme here is that of 'de-skilling,' which it has been shown in relation to craft skill, concerns positions of power within the work process. Secondly, the new needs of management will be looked at, needs which arose from the managerial program of de-skilling and which concerned control over labour, production and costs. In this context the new roles for supervisory and clerical workers will be considered. Finally, the resulting new shape of the work force as a whole, will be examined in a preliminary attempt to identify the process of class formation. In particular, the appearance of 'secondary labour market' characteristics amongst the lower paid factory workers will be related to the redesign of jobs which effectively employed family members during only one stage of the family life cycle.

The importance of the vatcrew and the weavers in their respective production processes has been shown in chapters 3 and 4, and

it was suggested that this strategic location in the division of labour induced management to mechanize their work. Since the position held by such handicraft workers has been identified as 'craft skill,' then management's assault on this artisan position can correctly be called 'de-skilling.' While it should be remembered that the term 'skill' in this context can be misleading, it will be retained because so much of the theoretical discussion and classification of occupations uses this term. It will be seen that the peculiar nature of this craft skill provides the basis for the analysis of de-skilling.

Artisan production was characterized in chapter 4 as containing much scope for intensification, to such an extent that Palloix describes the labour process as 'porous' from the point of view of surplus value production.<sup>1</sup> One of the central thrusts of the managerial attack on craft control was therefore to use machines to keep the workers moving at a pace determined by the mechanics of the powered machine, and not by their personal choice. This was effectively done both by the powerloom and by the papermaking machine, and this simple 'speed up' and intensification of labour was one of the more obvious aspects of de-skilling.

A second cost-reducing effort by management was, to a great extent, independent of the presence of machinery, although the disruption of established practice caused by mechanization was sometimes chosen as the moment to introduce such changes. This has been called the 'Babbage Principle' and has been correctly stressed by Braverman as the most important economic advantage of the division

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<sup>1</sup>See chapter 4, pp.51-52; and C. Palloix, "The Labour Process: From Fordism to Neo-Fordism," in C. S. E., The Labour Process and Class Strategies (1976), p. 49.

of labour. According to Braverman the greatest saving to management came not from the three features of the division of labour identified by Smith in his famous account of pin manufacture, but rather from a fourth advantage later expounded by Babbage.<sup>2</sup> This principle of Babbage's is sufficiently important to be quoted in full:

'That the master manufacturer, by dividing the work to be executed into different processes, each requiring different degrees of skill or force, can purchase exactly that precise quantity of both which is necessary for each process: whereas, if the whole work were executed by one workman, that person must possess sufficient skill to perform the most difficult, and sufficient strength to execute the most laborious, of the operations into which the art is divided.'<sup>3</sup>

In the passage quoted above, Babbage distinguishes only two types of labour each defined by its criterion of reward: there is skilled labour, and labour requiring force of strength. These two were undoubtedly important bases of reward in early nineteenth century manufacturing. But clearly there are other potential bases of occupational reward. (For example, the premium for loyalty or 'responsibility' paid to managerial workers, or the age and sex related payments made to those workers not adult and not male.) To the extent that there are many different possible bases for reward, we need to generalize from Babbage's simple twofold model of labour. The significance of Babbage's Principle is that the division of labour permits the grouping together of work tasks that are similar on any of a number of different dimensions of rewardability.

Two important implications of the Babbage Principle can thus

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<sup>2</sup>A. Smith, The Wealth of Nations, chapter 1: a critique of Smith on the division of labour appears in H. Braverman, Labour and Monopoly Capital: The Degradation of Work in the Twentieth Century (1974), chapter 3, "The Division of Labour."

<sup>3</sup>C. Babbage, On the Economy of Machinery and Manufactures (1832), pp. 175-176.

be seen. Firstly, as stressed by Braverman, management could reduce the cost of the total wage bill by reducing the amounts of highly paid skilled labour and increasing the proportion of low paid labour. But a second related aspect is arguably more important in the longer term, though it has been <sup>in-</sup>sufficiently noted in theoretical statements. Namely, jobs are designed, that is work tasks are grouped together, with a particular type of worker in mind. This ability to redesign jobs for a specific kind of worker implies that management may exercise the power to manipulate the criteria of reward, and hence innovate in the kinds and proportions of labour they employ. Management may thus possess the power to build into the new division of labour those cultural criteria which define the new types of worker they wish to employ. As we shall see, this applies equally to the creation of high paid 'managerial' labour and to the low paid age and sex specific jobs for 'labourers' and female youths. The profound social significance of the redivision of labour lies in this ability to embody selected cultural attributes of potential workers into the work content of jobs.

In this context a number of recent writers have emphasized the non-economic purposes of managerial strategy in redividing labour. Thus Marglin has characterized the main aim of bosses in mechanization as the creation of a hierarchy for purposes of control. From a different initial problem, Gordon has described the same process as 'balkanization,' because of the barriers created between different types of labour.<sup>4</sup> But both theorists have a common theme

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<sup>4</sup>S.A. Marglin, "What Do Bosses Do? The Origins and Functions of Hierarchy in Capitalist Production," in A. Gorz (ed.), The Division of Labour: Labour Process and Class-Struggle in Modern Capitalism (1976), pp. 13-54; D. M. Gordon, "Multiple Labour Markets," in A. P. M. Coxon and C. L. Jones (eds.), Social Mobility (1975), pp. 229-230.

in suggesting that management '...must therefore organize not only the machines and their integration but also a system of power relations the function of which ultimately is to define and enforce the discipline of the labour process.'<sup>5</sup> It may therefore be suggested that the process whereby labour was redivided involved for management the problem of weighing the cost-increasing aspects of the new production process against the benefits of greater control that these provided.

The actual configuration taken by these managerial decisions in two specific firms is therefore the special concern of this empirical study. In particular, the insufficiently emphasized use made of differentiation along dimensions of rewardability in the design of new jobs, permits identification of management's exploitation of cultural divisions. With this focus on the creation of occupational roles, the link can be made between objective place in the division of labour and subjective and political divisions within the working class without recourse for an explanation to an externally imposed concept of 'ideology.'<sup>6</sup> Management will therefore be considered as an agency of stratification, both in its immediate economic ranking by wages, and in its effects upon the underlying cultural distinctions between workers, the traditional criteria of reward, identified in chapter 3.

The kind of new jobs created by management in their re-division of labour can be seen as illustrations of the various methods of de-skilling outlined above. These include the simple

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<sup>5</sup>Brighton Labour Process Group, "The Capitalist Labour Process," in Capital and Class no. 1 (1977), p. 13.

<sup>6</sup>See Brighton Labour Process Group, op. cit.



reduction of wage differentials, the redivision according to the Babbage Principle and the substitution of labour paid according to a different criterion of reward.

The simplest case comes from the paper firm where the paper making process was both reduced in number of workers and in degree of differentiation, as becomes apparent when the period before redivision of labour (1811) and after redivision (1851) are compared. Although the case of paper making is fairly clear, it was sometimes the case that mechanization so altered the production process that it is difficult to compare the old hand methods with the new. The best method for studying how similar practical work tasks were done in different technologies is to use specific changes in the product as the basis for defining sub-units of the production process. Merrill has suggested that analysis take place at the level of these sub-units, which can be called 'stages of production' or 'production steps.'<sup>7</sup> Nineteenth century accounts of the process of woollen cloth production and paper production commonly used this method of analysis, for example, Baines broke the woollen cloth manufacturing process down into thirty four different steps.<sup>8</sup>

The changes that occurred in the paper making step of production, that is from the wet pulp to the sheet of paper dry enough to handle, are summarized in table 5.1. The remarkable increase in productivity of the machine over hand production (one machine was reckoned the equivalent of seven vats) was such that fewer workers could produce the necessary paper. The total number of workers

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<sup>7</sup>R. S. Merrill, "The Study of Technology," in International Encyclopedia of the Social Sciences (1968 edition) vol. 15, pp. 576-587.

<sup>8</sup>See K. G. Ponting (ed.), Baines' Account of the Woollen Manufacture of England (1970), pp. 71-73.

therefore fell, and this had the important consequence of reducing the ability of the old artisans to obtain new machine minding jobs in the same step of production. Despite a threefold increase in production levels, the absolute number of workers engaged in this paper making process fell from thirty three in 1811 down to fourteen men and lads in 1851 (see table 5.1).

TABLE 5.1: THE REDIVISION OF LABOUR I: OCCUPATIONS AND PAY IN PAPER MAKING, COWAN'S 1811 AND 1851.

<u>Before Redivision (1811)</u>					<u>After Redivision (1851)</u>				
<u>Occupation</u>			<u>Pay</u>	<u>Cost</u>	<u>Occupation</u>		<u>Pay</u>	<u>Cost</u>	
	%	(n)	$\bar{x}$	%		%	(n)	$\bar{x}$	%
Vatman	21	(7)	2.00	38	Machineman	43	(6)	1.60	62
Coucher	24	(8)	1.95	42	Junior "	14	(2)	1.10	14
Layer	21	(7)	0.40	8	App. "	43	(6)	0.60	23
Parter	21	(7)	3@0.85	7					
			4@0.30	3					
Feltcaster	12	(4)	0.25	3					
	99%	(33)		101%		100%	(14)		99%
Percentage of Total Work Force = 28%					Percentage of Total Work Force = 4%				
Mean Wage = 1.13					Mean Wage = 1.10				
Capacity = 7 Vats					Capacity = 21 Vats (Equivalent)				

Source: Cowan wage books 1811 and 1851.

The successful attack on the position of the skilled vatmen and couchers did not therefore simply result in an increase in output. The proportion of workers making paper decreased from 28 per cent to a mere 4 percent of the work force, thus reducing their

relative importance and their wage cost to the firm. With the average cost of labour in this stage of production about constant and a sevenfold increase in the productivity, the resulting cost of labour per unit of output was reduced to 14 percent of its former level (see table 5.1). Furthermore, the pay differential accorded to the highest paid worker in this step, the machineman, was reduced to 1.6 times the labourer wage, so that it cannot be said that the few men who remained in this stage of production were better paid. Although the machineman was to become the highest paid direct production worker in the firm (equal to the beating-engine worker), it would not be said of the machineman as it was of the hand producer that '...the vatmen were regarded as the most important persons connected with a paper mill.'<sup>9</sup>

In the relatively simple case of paper making, de-skilling took the form of machine pacing of work and reduced differentials, but as we have seen there were other tactics adopted by management. The redivision of labour implies also the ability to recombine tasks, as well as redivide them, and in the case of paper making, differentiation was reversed and the number of jobs reduced. But this was the opposite of the usual trend implied by the Babbage Principle, and the next two examples will illustrate the kind of differentiation and dilution that was carried out.

In its simplest form the de-skilling of jobs by subdivision is illustrated by the case of the woollen dyeing process. This was basically non-mechanized at the later period (1881), there being boilers for the dyes and sinks for rinsing. While in the earlier period (1851) the dyeing work was done by a dyer (wage 1.7 labourer

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<sup>9</sup>D. Bremner, The Industries of Scotland, Their Rise, Progress and Present Condition (1869), p. 326.

wage units) and his three apprentices, thirty years later the heavier manual work had been removed and given to thirteen dyer's labourers (mean wage 0.9). The technical knowledge of dyes was retained for one man who became the foreman dyer with the huge wage differential of 3.6 times the labourer wage.<sup>10</sup> Such high wages were probably the result of a recognition by management of the potential power of such a knowledgeable man placed in a key position in the production process, the high wages being an attempt to separate him off from the rest of the labour force.

These changes in wool dyeing reveal two important features of the new division of labour in the machine factory. Firstly, 'unskilled' career labourers had been created, a category of labour that did not exist in artisan handicraft production. The dyer's labourers were paid at or slightly below the general labourer's wage, yet they were all adult men (average age 42 years) and often heads of household (55 percent). Such workers did not have the chance of promotion to the foreman dyer's job as did apprentices to the dyer in earlier period, and could therefore be identified as permanently 'unskilled' men.<sup>11</sup> But the counterpart of such de-skilling was what Palloix has called 'hyper-skilling' and it can be seen that '...the corollary of de-skilling is the process of concentration of knowledge.'<sup>12</sup>

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<sup>10</sup>Wage figures come from the wage books of Ballantyne's woollen mill, 1851 and 1881.

<sup>11</sup>C. J. Wilson in evidence to the Royal Commission on Labour said 'Most of the dyer's labourers we call unskilled men,' (7509) Parliamentary Papers (1892). Information on age and household status of the dyer's labourers comes from the wage book to census linkage of 1881. Of the 13 labourers, 2 were not linked, and quoted figures are based on the other 11. Information on the lack of machines comes from the valuation inventory of Ballantyne's mill in the late 1870's. Ballantyne MSS collection.

<sup>12</sup>Palloix, "The Labour Process," p. 52; see also Brighton Labour Process Group, "The Capitalist Labour Process" p. 19.

In this example of dyeing the required knowledge was, in the early 1880's, concentrated in the person of the foreman dyer, although this job was clearly vulnerable to the outside introduction of 'scientific' knowledge which indeed happened later.<sup>13</sup>

The twin processes of de-skilling and concentration of knowledge involved the dividing of adult male tasks along lines that concentrated knowledge of and control over the production process in the smallest number of individuals. Such knowledge and power over production had been the basis for high pay in the artisan mode of production. While this continued to be true for a small number of individuals in 'machinofacture,' it was mixed with an element that received a new importance, namely authority and the exercise of control over others. Thus, while previously there had been a kind of teacher-pupil relationship between an artisan and apprentices learning a job, after redivision of labour there was one man giving orders to other adult males who were in many cases older than himself. The element of authority which such giving of orders required, added a major new criterion of reward, which combined with direct knowledge of production, was no doubt responsible for the foreman dyer's exceptionally high wages.

Management's use of differentiation according to the Babbage Principle was, in the case of the de-skilling of woollen weaving, combined with yet another device that diluted labour. As we have noted earlier, powerloom weaving was done by women, and it was suggested in chapter 3 that these workers were low paid

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<sup>13</sup>Bremner says '...dyeing is one of the most important departments of the manufacture. Some knowledge of chemistry is essential on the part of the foreman, and a thoroughly efficient man never fails to obtain liberal wages,' Industries of Scotland, p. 165.

because of an estimation of their worth in terms of domestic status and subsistence needs. It can therefore be seen that by replacing male artisans with women workers, management had changed the criterion of reward underlying the job of weaving from that of craft skill to that of domestic status. From this we could expect that while the retained handloom weavers would keep their old differential, the new powerloom weavers would be paid at a level well below that of a male labourer. The wage differentials in the weaving step of production shown in table 5.2 confirm this expected pattern.

Over the whole process of weaving the average wage of workers was reduced from 1.27, a medium male level, to 0.94, and below that of a labourer. The effect of this was to reduce costs to the firm by over a quarter, or from the opposite point of view, labour in this section had been reduced or diluted by 26 percent. For every female weaver employed instead of a male, there was a reduction from 1.3 to 0.8 labourer wage units, which was a 38 percent dilution.

TABLE 5.2: THE REDIVISION OF LABOUR II: OCCUPATIONS AND PAY IN WOOLLEN WEAVING, BALLANTYNE'S 1851 AND 1881.

<u>Before Redivision (1851)</u>					<u>After Redivision (1881)</u>				
<u>Occupation</u>			<u>Pay</u>	<u>Cost</u>	<u>Occupation</u>			<u>Pay</u>	<u>Cost</u>
	%	(n)	$\bar{x}$	%		%	(n)	$\bar{x}$	%
Foreman	3	(1)	2.00	5	Foreman	1	(1)	3.26	3
Handloom Weaver	83	(25)	1.28	84	Handloom Weaver	13	(18)	1.37	19
Apprentice Weaver	10	(3)	0.80	6	App. H.L. Weaver	6	(8)	0.64	4
Warper	3	(1)	1.75	5	Powerloom Weaver	66	(92)	0.80	56
					Warper	2	(3)	1.74	4
					App. Warper	1	(1)	0.89	1
					Pattern Designer	1	(2)	2.50	4
					Pattern Warper	1	(1)	2.06	2
					Powerloom Tuner	4	(6)	1.39	6
					App. P.L. Tuner	5	(7)	0.50	2
	99%	(30)		100%		100%	(139)		101%
Percentage of Total Work Force = 37%					Percentage of Total Work Force = 36%				
Mean Wage = 1.27					Mean Wage = 0.94				

Source: Wage books Ballantyne's woollen mill 1851 and 1881.



Not only did this step of production undergo a change in the nature of reward for workers in the main occupation, weaving, but that occupation was subdivided into a number of distinct parts. Thus powerloom weaving was not the same as handloom weaving as a job because the pattern weaving had been removed (pattern warping was even separated out as a distinct job), and this work was given to special hand weavers. Secondly the setting up and removing of cloth from the powerlooms was separated out and, possibly because it was heavier and slightly more skilled work, was given to medium paid men - the powerloom tuners and their apprentices. Finally, the designing of the cloth patterns was removed, thus creating a highly paid, hyper-skilled job for two men paying an average of 2.5 times the labourer wage.

In this example of weaving we can see the Babbage Principle at work in the redivision of labour; the mixed job of weaver<sup>14</sup> was separated into an 'unskilled' female part comprising 66 percent of the labour needed, a medium paid part (tuner) being 9 percent of the workers needed, and a small highly skilled part, 5 percent, namely the warpers and designers - the remainder being a foreman and handloom weavers. When we consider that the domestic weaver did his own warping, it can be seen that the artisan job has really been redivided so as to turn one job into seven different jobs.<sup>15</sup>

The effect of this differentiation of tasks was to separate out the jobs on the basis of rewardable characteristics such as skill (warpers and designers), strength (tuners), authority (foreman),

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<sup>14</sup>The artisan handloom weaver before mechanization spent over 10 percent of his time on patterns and warping - thus in 1861, eighteen weavers spent a total of 611 hours on these activities out of a total in a four week period of 4,320 man hours.

<sup>15</sup>This number includes the foreman. Note that the domestic weaver was his own foreman, the weaver working to the discipline of market forces - see below p. 101.

and household or family situation (women powerloom weavers). From this, a simple subtraction of the mean wage for each group suggests the order of the differential that was accorded to each characteristic. Thus in relation to the basic male adult wage (1.0), skill received between 0.7 and 1.3, strength received 0.4, authority 2.3 and femaleness -0.2. This is a considerable simplification since the rewardable qualities may well have been mixed, a single occupation containing more than one.

However, it can be concluded that the effectiveness of the managerial attack on the position of the skilled artisan in weaving was made possible in part as a result of the divisive nature of the reward criterion used by the artisans to justify their position. By co-existing with low paid women in the handicraft period, the artisans had left themselves open to substitution by cheaper workers, a situation that would have been less likely had a 'solidaristic' labour situation existed in which the worth of all workers was evaluated on the same basis. In this example we have seen how, what some sociologists have termed 'the value system,' the culture of the time, was utilized by management in a situation of power to divide and re-stratify labour.

The re-structuring of occupations by management was effective in destroying the older craft control over the production process, but a necessary consequence of this was that a new form of control had to be exercised over labour in particular and costs in general. The personnel needed to carry out these new functions were therefore new costs to capital that had to be considered in relation to the wage savings made from the various forms of dilution of labour discussed above. This increased responsibility of management was,

of course, part of the plan in de-skilling, namely to seize control over the production process itself. Previously, in what has properly been called the 'manufacture' stage, management had been concerned mainly with the external relations of the firm (e.g. supply of raw materials, finance, sales), and the process of production had itself been under the control of artisans who used traditional methods. By contrast the new and distinctive feature of 'machinofacture' was that management assumed responsibility for and control over the production process in all its details and they thereby revolutionized the labour process.<sup>16</sup>

A first requirement of this new managerial task was for an adequate control over the direct production workers. It has been suggested by some theorists that the need for coordination and control was made greater by the differentiation of occupations and growth in the size of the firm, and that this in itself may have created anomie and the need for integration. While such a view of the division of labour goes back at least to Durkheim and has been given expression in a historical context by Smelser,<sup>17</sup> such an approach seems unhelpful in this context. This is chiefly because within the firm the differentiation that took place did so as a direct result of managerial policy. Insofar as this was a planned development it was in marked contrast with the division of labour in society as a whole (in nineteenth century Britain there was no co-ordinating agency equivalent to the management of a firm.) It was with this latter distinction in mind that Marx contrasted the

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<sup>16</sup>Palloix, "The Labour Process," pp. 51-53.

<sup>17</sup>See for example the discussion of Durkheim's The Division of Labour in A. Giddens, Capitalism and Modern Social Theory (1971), pp. 70-81; N. J. Smelser, Social Change in the Industrial Revolution (1959).

division of labour in manufacture with that of society as a whole, and he noted that whereas democracy was the ideal form of government for society, inside the firm it was not democracy but dictatorship that ruled.<sup>18</sup>

In identifying the new character of control over the workers in factory production, Marx pointed to the supervisory workers and the factory foremen, and he saw the discipline they imposed as being like that of an army.<sup>19</sup> Such direct authority can be contrasted with what previously existed, for example, in the case of the handloom weavers. Pignon and Querzola have suggested that the other main method of control of labour is by the market forces through exposure to the mechanism of price change. This was the case with the woollen handloom weavers, who were paid at the same rate per piece as domestic outworking weavers in Galashiels in the 1850's. The work discipline imposed on these weavers was the internal one of avoidance of being 'uneconomic' and replaced by others contracted to do the work.<sup>20</sup>

While it has been noted in chapter 4 that handloom weavers preferred to avoid employments with supervision by foremen, it is not clear that control by market forces was any less arbitrary and alienating to the worker. Indeed the uncertainties imposed by the

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<sup>18</sup>K. Marx, Capital (1976), p. 477; see also D. Pignon and J. Querzola, "Dictatorship and Democracy in Production," in Gorz (ed.), Division of Labour.

<sup>19</sup>Marx, Capital, p. 549.

<sup>20</sup>The similarity of the work situations of both domestic out working and factory loomshop weavers is shown by the conditions agreed after the Galashiels strike of 1849 in which the piece rates paid to both kinds of workers were basically the same - see R. Hall, History of Galashiels (1898), pp. 357-358; Pignon and Querzola, "Dictatorship and Democracy in Production," in Gorz, Division of Labour.

vagaries of price changes in the market may have been just as cruel in its effects on the self-employed worker as anything devised by an employer.

The degree to which direct supervision of work was introduced into the woollen and paper firms of this study can be estimated both qualitatively, as well as in the quantitative increase in the number of workers carrying out these supervisory functions. The number of purely and mainly supervisory workers in the two firms before and after the redivision of labour is given in table 5.3. The increase in supervision and in the wage differential that this activity commanded, is most evident in the woollen firm, where the Babbage Principle was carried through most completely. Here the number of supervisory personnel grew from one person in 1851 to thirteen in 1881. This was an increase from 1 percent to 3 percent of the work force, but was effectively much greater than this figure would suggest, since the supervision ratio (of production workers to supervisors) in factories can be as high as 100:1. The low number of supervisors in the paper firm was possible for this reason: three foremen had respectively 118, 79 and 37 women workers under their supervision, and control by a few men of such large numbers enabled management to keep the total number of supervisors down to five (under 2 percent of the work force.) Nevertheless the trend over time is clearly in the direction of increased supervision, and this was most developed in the woollen firm where de-skilling had been more thorough.

TABLE 5.3: PERCENTAGE OF TOTAL WORK FORCE IN CLERICAL AND SUPERVISORY WORK, WITH MEAN WAGES (LABOURER WAGE EQUIVALENTS), BEFORE AND AFTER REDIVISION OF LABOUR, BALLANTYNE'S 1851 AND 1881, AND COWAN'S 1811 AND 1851.

	<u>Wool</u>						<u>Paper</u>					
	<u>Before</u>			<u>After</u>			<u>Before</u>			<u>After</u>		
	%	(n)	$\bar{x}$	%	(n)	$\bar{x}$	%	(n)	$\bar{x}$	%	(n)	$\bar{x}$
<u>Supervisory</u>	1		2.0	3		2.7	2		2.9	1		2.6
		(1)			(13)			(2)			(5)*	
<u>Clerical</u>	-		..	2		1.1	-		..	2		1.0
		(0)			(7)			(0)			(6)	

Note: \*In order to be comparable with the woollen firm, the paper mill manager has been included in the frequency count of supervisory personnel. The mean wage given for the period after re-division of labour assumes that the manager, who appears in the census but not in the wage book, earned 5.0 times the labourer wage - this seems a reasonable estimate considering that the woollen firm's manager earned 6.33 labourer wage units and the paper mill tended to have slightly lower differentials after reorganization.

Source: Wage books, Ballantyne's 1851 and 1881; Cowan's 1811 and 1851.

The pay levels of such supervisory workers reveal that they were highly rewarded, even in relation to the high paid direct production workers ('skilled manual workers' in conventional terms). This is shown in table 5.4 which reveals that the differential paid for supervisory work was more than twice the labourer's wage and usually at least 1.2 labourer wage units above the high paid non-supervisory production workers. This suggests that 'authority' itself was being rewarded as a recognition of the increased importance of this type of work.



TABLE 5.4: WAGE DIFFERENTIALS FOR SUPERVISORY, CLERICAL AND OTHER 'SKILLED' WORKERS, AFTER REDIVISION OF LABOUR, BALLANTYNE'S 1881, AND COWAN'S 1851.

	<u>Wool</u> (1881)				<u>Paper</u> (1851)			
	<u>Clerical</u>		<u>Non-Clerical</u>		<u>Clerical</u>		<u>Non-Clerical</u>	
	$\bar{x}$	(n)	$\bar{x}$	(n)	$\bar{x}$	(n)	$\bar{x}$	(n)
<u>Supervisory</u>	2.22	(1)	2.73	(12)	1.30	(2)	2.64	(5)*
<u>Non-Supervisory</u>	0.94	(6)	1.45	(61)	0.83	(4)	1.44	(45)
Premium for Supervision (Difference in mean pay)	1.28		1.28		0.47		1.20	

Note: \*See note to table 5.3 for inclusion of manager in this cell. Wages in labourer wage units.

Source: Wage books, Ballantyne's 1881 and Cowan's 1851.

Along with personal supervision came other practical methods of **controlling** the work force. Thus the woollen firm erected a gate lodge and had a full-time 'lodge and timekeeper' (at a pay of 0.94 labourer wage units) in 1881. This man's job was to check times of arrival and departure from work, and, in apparent confirmation of Hall, this function did not exist in 1851.<sup>21</sup> In the paper firm there was introduced a system of fines, both for poor quality of work and for indiscipline inside the factory. Thus the wage clerk of Cowan's in 1851 entered in the wage book by the names of six young women *salle* (finishing room) workers, the note "Fined 3d. for leaving work too soon." And in the same month four adult male

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<sup>21</sup>The occupational title of the gatekeeper comes from the Ballantyne wage book/census linkage 1881. For lack of *gatelodges* in the earlier period see Hall, History of Galashiels, pp. 358-359, and above chapter 4, p.55.



calender workers (low paid machine operators, wage 0.95 labourer wage units) were each fined 6d., 'Fines for being in Gashouse in defiance of notice: Paid back as being first offence.'<sup>22</sup> In both cases the level of the fine was about 5 percent of the worker's weekly wages, and as in the woollen firm, there is no record of such fines in the artisan, pre-mechanization period.

The significance of the new supervisory relations has been argued by Foster to have been profound, at least in the cotton and engineering industries of Lancashire. The increase in supervisory work of the kind involving pace-making and driving, particularly where adult males controlled women workers, has been argued to have been part of the reason for the deradicalization of workers and the labour movement in general in the period after the collapse of Chartism. The extent to which this change in the labour process could have produced the mid-Victorian 'labour aristocracy' phenomenon has been questioned by G. S. Jones, yet it is interesting to ask whether a similar effect occurred in the paper and woollen firms studied here.<sup>23</sup>

If this relationship between adult males and women workers is conceived in its broadest terms as encompassing all men who worked in the same department of production as women, then both firms showed a considerable increase in this phenomenon. Men who worked with women increased in both firms, for whereas in artisan production there had been considerable sexual segregation (see chapter 3, pages 42 and 43), after redivision of labour in both

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<sup>22</sup>Cowans wage book 'Wages to 1st. November 1851.'

<sup>23</sup>J. Foster, Class Struggle and the Industrial Revolution (1974), pp. 224-238; and G. S. Jones, "Review of Foster," in New Left Review, no. 90 (1975), pp. 61-64.

firms, the proportion of men working in the finishing processes increased, both in supervisory capacities and in working the new machines that had been introduced into these later steps of production. As a proportion of all males employed, those working in the same department as women increased in the paper firm from 10 percent to 29 percent, and in the woollen firm from 14 percent to 23 percent.<sup>24</sup> Although these figures are slightly lower than the 'one third' claimed by Foster,<sup>25</sup> it does seem that the new sexual division of labour within the factory increased exposure of adult males to work contacts with lower paid women workers. It is therefore possible that this increased the frequency of authority relations of men over women, or at least shifted men's comparative reference point to a group of workers lower paid than themselves.

Growing up together with the new supervisory workers was another group who owed their existence to the same source. These workers were the clerks, a category of workers who did not exist in the firms in the early period (see table 5.3). Any paper work was probably done in that earlier period by the owner-manager, by the foreman or by the workers themselves. Clerical work was often not separate in the early factories, for example, Gulvin notes that there was frequently no separate room set aside for an office, only a shelf or window-ledge for the books of accounts and ledgers.<sup>26</sup>

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<sup>24</sup>These figures come from a study of the department of work as shown in the wage books and from a study of the work process. Paper firm male workers in the ragcutting and finishing (salle) were 1811=6/60, 1851=46/156; in the woollen firm, men in the weaving shed, finishing room, and birling room were 1851=7/50, 1881=44/192.

<sup>25</sup>Foster, Class Struggle and the Industrial Revolution, p. 237.

<sup>26</sup>C. Gulvin, The Tweedmakers: A History of the Scottish Fancy Woollen Industry (1973), p. 181.

The need of management was for greater control not only over the workers directly but also over the costs of production in general. Braverman has described the clerical work process as parallelling in paper and ink form, the work carried out by the direct producers on the shop floor.<sup>27</sup> The need for this new kind of labour was similar in origins to the need for supervision: the direct producer was removed from accounting, in terms of his or her own production function, for the units of time, effort and technical change that went into production. While managerial control of labour through clerical accounting became more developed with the passage of time, it can be seen that these earliest forms of white collar work had their origins at the point in time of de-skilling and mechanization - that is, at the birth of full 'machinofacture.'

Since such clerical work can be seen as an essential feature even of early machine factory work, such origins are particularly interesting in view of the huge growth that was to take place subsequently in the size of the white collar sector, both inside the firm and in the national labour force. It may be noted firstly that the number of workers involved was small, even at the end of the period studied, there being only six or seven clerical workers, that is, about 2 percent of the work force in both firms. (See table 5.3.) Secondly, it is also clear that they were very low paid, earning on average about the same wage as a general labourer. This can partly be explained by the fact that they were frequently apprentices (50 percent in the paper firm, and 29 percent in wool). However, this is only part of the explanation.

The situation of the clerks was complex because, as Lockwood

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<sup>27</sup>Braverman, Labour and Monopoly Capital, pp. 298-304.

has pointed out, there were apparently two different kinds of clerks employed. In the generally poorer paid industrial employments, clerks were either fairly low paid young men who could expect only medium wages by the time they were old, or else they were those who got placement by 'family background,' and who were in effect serving an 'apprenticeship to capital,' and could later expect to be owners and managers of business.<sup>28</sup>

Both kinds of clerk could be found in the two firms studied, the latter type being particularly common in the woollen firm. The Ballantyne sons all seem to have served their apprenticeships in the 1860's as office clerks, and being relatively well paid, their prospects were also good, for they went on to start their own businesses.<sup>29</sup> By 1881 however, the firm had started employing three clerks in the main office who were apparently unrelated to the owners, and had only one Ballantyne. The highest paid ordinary clerk earned 2.2 labourer wage units (40 shillings per week) and the usual wage for an adult clerk in his early twenties was about 1.2 (or 22 shillings per week.) In the paper firm on the other hand, there appear to have been no sons of owners employed in this way, and the only senior clerk earned 1.2 labourer wage units, the apprentices getting between 0.7 and 0.8 at 18 years of age, which were low wages indeed.<sup>30</sup>

It can be concluded that by the end of our period in both

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<sup>28</sup>D. Lockwood, The Blackcoated Worker: A Study in Class Consciousness (1958), pp. 25-29.

<sup>29</sup>D. Ballantyne, Ballantyne of Peebles (Company history, not dated, c. 1950?), pp. 11-12.

<sup>30</sup>Wage figures and ages come from wage book/census linkages, Ballantyne's 1881 and Cowan's 1851.

firms, there had been established a clerical staff who carried out new and increased functions that were intimately related to the de-skilling of manual labour. The new managerial control over the labour process, involving both control over the actions of the workers and over the costs involved, utilized the labours of low paid clerical workers who were usually not the kin of the owner. Such low pay implies that there existed none of the surplus payment for loyalty to the aims and objects of the enterprise that has been suggested is characteristic of clerical work of certain kinds in the twentieth century.<sup>31</sup>

The extended managerial authority of the mechanized factory appears to have been exercised by the owner-manager who lived close to the firm and took responsibility for the everyday running of the firm. The so called 'separation of ownership and control' cannot be argued to have taken place by 1851 in the paper firm, nor by 1881 in the woollen firm.<sup>32</sup> The only change at the highest level in the two firms was that the owner was assisted by a highly paid manager, a job which did not exist in the artisan period of production, and which was very highly paid (see note to table 5.3, p. 109). Managers appear to have risen within the firm, by a process of internal recruitment. Thus Wilson emphasized the dramatic rise of James Birrell who, from being a humble clerk in 1851 (pay=0.7 labourer wage units at 18 years of age), retired as manager of Cowans in 1888.<sup>33</sup>

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<sup>31</sup>Pignon and Querzola, "Dictatorship and Democracy in Production," in Gorz (ed.), Division of Labour.

<sup>32</sup>A. Giddens, The Class Structure of the Advanced Societies, p. 167.

<sup>33</sup>The Annals of Penicuik, Being a History of the Parish and of the Village (1891), pp. 124-125.

Similarly, in the woollen firm the manager John Tait, rose from being a woollen warper in 1851 to the top job and pay of over six times the labourer wage by 1881. In both cases their rise was associated with long service, and the opportunities for upward mobility of this kind were very limited, given the small number of such top jobs.

So far we have considered the seizure by management of real control over the labour process in two aspects: firstly in its de-skilling of the direct production workers, and secondly in its consequent need for new forms of control over worker discipline and over the book-keeping aspects of costs. Some overall features of the post-mechanization work force will be presented next, in particular as the managerial policy of paternalism related to the increased proportions of low paid workers.

Managerial policy and style appears to have been firmly in the hands of the owner, and in this there was a strong similarity between the two firms. Both may be described as paternalistic and even patriarchal in style, and this impression appears to have been made very forcefully. Thus one of the Ballantyne family talks about 'our village' and life was described as of a 'somewhat patriarchal nature.'<sup>34</sup> The historian Marwick notes the 'paternalist methods of factory control' of Victorian employers in Scotland, and notes the 'humanitarian' conditions established by Cowan in his paper mills.<sup>35</sup>

All this appears somewhat paradoxical when it is contrasted

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<sup>34</sup>H. (?) Ballantyne, Henry Ballantyne and Sons, Limited, Walkerburn (1929), p. 25.

<sup>35</sup>W. H. Marwick, Economic Developments in Victorian Scotland (1936), p. 122 and p. 140.



with the actual changes occurring in these mills during the period of this study. Both firms underwent an increase in the proportion of female workers of about 10 percent, raising the total in the woollen firm to 50 percent of all workers and in the paper firm the comparable figure was even higher, being 60 percent.<sup>36</sup> This feminization was also combined with an increase in the employment of young persons, both of which tendencies appear to conflict with the paternalistic policy announced by the 'enlightened' employer Cowan. Not only did the manager of the Cowan mills write to the Children's Employment Commission in 1864 that children under 13 years were not employed, but he adds that 'with a view to prevent the neglect of children in their homes, we do not employ mothers of young children in our works, unless in the case of widows or women deserted by their husbands, or having husbands unable to earn a livelihood.'<sup>37</sup> The implications of such a policy were manifold, and this employment policy will be returned to at many points in the discussion below.

The first important point to note is the method by which the firms managed to combine the two trends described above, that is, an increase in females and young persons while at the same time denying themselves the services of those under 13 years and many married women. The radically new strategy adopted by management to solve this potential conflict of aims is suggested by table 5.5. What was in fact done was to increase dramatically the proportion of young unmarried women. This specific age and sexual category of labour was

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<sup>36</sup>These figures come from the wage book/census linkages, Ballantynes 1881 and Cowans 1851.

<sup>37</sup>Letter from Prideaux Selby, Manager, Valleyfield Mill (Alexander Cowan and Sons) to Fourth Children's Employment Commission, Parliamentary Papers (1865), XX, p. 178.



so intensively utilized as to increase its share of the work force by 26 percent in the woollen firm, so that daughters alone comprised 40 percent of the workers. In the paper firm almost as large a proportion, namely one third, of all workers had the family status of daughter.

TABLE 5.5: RELATIONSHIP TO HEAD OF HOUSEHOLD OF ALL WORKERS IN BALLANTYNE'S 1851 AND 1881, AND COWAN'S 1851.

<u>Relationship to Head of Household</u>	<u>Wool</u>		<u>Paper</u>
	<u>Before</u> (1851)	<u>After</u> (1881)	<u>After</u> (1851)
	% (n)	% (n)	% (n)
Head Male	36 (25)	22 (82)	24 (88)
Head Female	9 (6)	2 (7)	9 (34)
Wife	11 (8)	2 (6)	7 (26)
Son	21 (15)	17 (63)	11 (40)
Daughter	14 (10)	40 (145)	32 (118)
Other Relative	1 (1)	4 (15)	6 (23)
Lodger etc.	7 (5)	13 (47)	11 (39)
Total	99 (70)	100 (365)	100 (367)
Not linked	(12)	(23)	(25)
Total in wage book	(82)	(388)	(392)

Notes: Source: Wage book/census linkages Ballantyne's 1851 and 1881, Cowan's 1851.

Note: 'Lodger' includes 'boarder' and other non relatives in the household.

Table 5.5 shows that the proportion of married women employed (census defined 'wives') declined in the woollen firm to a

mere 2 percent of all workers. And while the domestic status of the paper workers before mechanization cannot be determined, the high proportion of daughters employed suggests that the same pattern as in the woollen firm may have occurred, with fewer wives being employed there too.

A number of important consequences followed from this intensive use of unmarried female labour and exclusion of many married women. Firstly, both firms were supplied with large amounts of relatively cheap labour, since on the whole women continued to be paid significantly less than even the new category of labourer wage men. Even though the male differential in wages over those of women declined in both firms, the reasons for this were due to two different causes. In the paper firm the decline in male wages due to the abolition of the skilled artisan jobs was responsible for the narrowing of male-female differentials, since women's wages hardly changed. On the other hand, in the woollen firm the women's average wage rose because of the apparent breakthrough achieved by one of the women's occupations, namely the burlers. These differentials appear in table 5.6.

TABLE 5.6: THE MALE - FEMALE WAGE DIFFERENTIAL: MEAN WAGES FOR ALL ADULT WORKERS, BEFORE AND AFTER REDIVISION OF LABOUR IN BALLANTYNE'S 1851 AND 1881, AND COWAN'S 1811 AND 1851.

	<u>Wool</u>			<u>Paper</u>		
	<u>Before</u>	<u>After</u>	<u>Change</u>	<u>Before</u>	<u>After</u>	<u>Change</u>
	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$
<u>Male</u>	1.4	1.4	0.0	2.0	1.5	-0.5
<u>Female</u>	0.4	0.8	+0.4	0.6	0.6	0.0
<u>Male Dif-</u> <u>ferential</u>	—	—	—	—	—	—
	+1.0	+0.6	-0.4	+1.4	+0.9	-0.5

Source: Wage books, Ballantyne's 1851 and 1881, Cowan's 1810 and 1851.

Note: Wages are means for five pay periods closest to census night, in labourer wage units.

The burlers were exceptional in that they were the only female occupation which managed to achieve parity with at least some adult male occupations. In 1881 the burlers had an average wage of 1.0 labourer wage units (standard deviation =  $\pm 2.7$ ) and had apparently broken through the traditional criterion of reward that limited women to a fraction of the adult male's wage. This fact of relatively high wages may well have been due to the organization of these women workers and the creation of some kind of shopfloor bargaining strength, since these workers were very similar, in age and household position, and in the kind of work that they did, to other women workers in both firms.

The work done by the burlers was finishing and mending faults that appeared in the cloth after weaving, work which required great manual dexterity and speed of work, but which was entirely non-mechanized. In this respect they were like the great majority of female workers in the two factories in the period that has been

described as 'after mechanization.' The mechanization of the main production processes left the preparatory and finishing work done by women in many cases little changed, and the stress that has correctly been placed by Samuel on the coexistence of mechanized and unmechanized, labour intensive work is empirically validated in the two firms of this study.<sup>38</sup> Indeed the point of Tilly and Scott that most women worked in unmechanized jobs similar to sweated work done in the home, can be extended even to large factories described as 'mechanized.'<sup>39</sup>

The important exception to the rule of women's work being unmechanized was, of course, the job of powerloom weaver, which as has been discussed earlier, became women's work after the defeat of the male weavers. Such women powerloom weavers were 23 percent of the work force and 46 percent of the females employed, and their wages, while they increased to average about 0.8 of the labourer wage (see table 5.2), were still paid under 60 percent of the male weavers' wage.

However, it must not be thought that the weavers were passive in their acceptance of their work role - women weavers established a strong bargaining position through the retention of a one worker per powerloom staffing level. As a result it was difficult to make a partial change in this working arrangement, which survived well into the twentieth century when it was technically possible for a single operator to mind more than one machine. Gulvin describes the case

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<sup>38</sup>R. Samuel, "Workshop of the World: Steam Power and Hand Technology in Mid-Victorian Britain," in History Workshop vol. 1, no. 1 (1977), pp. 6-72.

<sup>39</sup>J. W. Scott and L. Tilly, "Women's Work and the Family in Nineteenth - Century Europe," in Comparative Studies in Society and History, vol. 17, no. 1 (1975), pp. 36-64.

of an employer who tried to break this practice by getting women to work more than one loom, but the women workers were sufficiently well organized to prevent an attempt to introduce blackleg labour, and restored the traditional working arrangement.<sup>40</sup>

The increasing use of young unmarried women as a source of cheap labour was made possible by an increase in the supply of people of the desired age and sex. This increase in the supply of persons from a specific section of their life-course had important implications for the families that supplied labour to the firm, and for the level and distribution of inequality in the local community. These questions require more extended treatment and will be discussed in chapter 6 in relation to the factory family. It is, however, important for an understanding of managerial strategy in the redivision of labour, and of labour's response and adaption to it, that a preliminary sketch is made of the domestic situation of the newly created and expanded age and sexually specific categories of labour. This is because it will be argued that the managements of the two firms studied, initiated a new form of utilization of workers during the period of the redivision of labour. Such a new use of their workers was predicated upon high turnover of labour because of the linkage of certain jobs to specific stages of the life-cycle. This important change will underlie much of the subsequent discussion in this study.

As has already been noted, the most expanded category of workers employed was unmarried women, and these we have seen were most frequently the daughters of families (see table 5.5). Such women workers were clearly employed in jobs that had no 'job ladder'

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<sup>40</sup>Gulvin, Tweedmakers, p. 184.

or promotion pattern that extended beyond their usual age of marriage.<sup>41</sup> For example, in the woollen firm the average age of the female powerloom weavers was 22 years, and a small sample of local marriage registers suggests that the average age of marriage of women woollen factory workers was also about 22 years (s.d.  $\approx$  2 years.)<sup>42</sup> The decline in married women's work meant that by the end of the period of this study both firms had made their female jobs specifically for one stage of the life cycle.

It will be suggested that it was not a coincidence that another occupational innovation of this period was also created, not only for a particular age and sex category, but also to be held during a specific stage of the family life cycle. This new type of worker has already been noted: it was the adult male labourer. A 'labourer' has been defined as an adult male worker not in his teens or twenties, paid between 0.9 and 1.1 on the labourer wage scale, and who holds a low paid job which is not part of a promotional ladder leading to better pay. On the contrary, labourers were often in their thirties or older, and as we shall see in chapter 6, often also the parents of working age children. The conclusion that will be suggested is that these labourers were frequently the fathers of the extra daughters employed by the firms, and that the new practice of life-cycle-stage specific employment prevented, for both of them, the possibility of promotion of job ladders over a career. The symbiotic relationship between these two kinds of 'dead-end' jobs

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<sup>41</sup>For the importance of 'job ladders' and promotion patterns, see above, chapter 4, pages 38-39.

<sup>42</sup>The figure for the average age of marriage comes from the first ten years of marriages registered as taking place in Walkerburn 1856-65. Total marriages = 10.

has important implications that will be discussed in chapter 6.

Adult male labourers numbered 72 in the woollen firm and 44 in the paper firm, being respectively 19 and 11 percent of the work force. They were, however, a much higher proportion of all heads of household, being 38 percent of all household heads employed in the woollen firm and 25 percent of those in the paper mill. The specific occupations held by such labourers were, in the woollen factory, carding room hands, spinner's labourers, finishers, dyer's labourers, and woolstore and millhouse labourers; in the paper mill, labourers were to be found as rag porters, rag boilers, bleachers, and calenderers. These new factory labourers had an importance that was even greater than their numbers suggest.

In its creation of this low paid, non-promotional stratum, managerial strategy in the redivision of labour may be said to have created jobs remarkably similar to what has been described as the 'secondary labour market'.<sup>43</sup> Doeringer and Piore have contrasted this kind of employment with that of a 'primary' market, which they see as not only higher paid and having promotional possibilities, but also as having important connections with the family and community background of the workers. However, in contrast to the emphasis which these authors place on the attitudes of the workers, it will be argued in chapter 6 that the dynamics of the family economy through the life cycle can explain the turnover and migration of these 'secondary' workers.<sup>44</sup>

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<sup>43</sup>See P. B. Doeringer and M. J. Piore, Internal Labor Markets and Manpower Analysis (1971).

<sup>44</sup>For summary and critique of dual labour market theories, see D. M. Gordon, "Multiple Labour Markets," in Coxon and Jones, Social Mobility, pp. 208-216.



By contrast, the high paid workers in both firms might be expected to have built up elaborate job ladders that were increasingly removed from the technical necessities of the production process. Such, at least, is the implication of the work of Stone on the managerial creation of job structures in the American steel industry.<sup>45</sup> While there does seem to have been an increase in the payment of different wages within the same occupation, the development of an 'internal labour market' does not seem to have been an object of management in either firm during the period of this study.

However, at least some higher paid occupations appear to have gained specific advantages in spite of the general cost reductions introduced by management. One example of successful resistance to dilution and de-skilling comes from the woollen firm, where the spinners kept their occupation male and highly paid (average 2.0 times the labourer wage.) By so doing, they prevented the substitution of female labour which would almost inevitably have been lower paid. Such a change did in fact take place in the Scottish linen textile industry.<sup>46</sup> And this kind of dilution was certainly more feasible after the introduction of 'self-acting mules' in the 1870's and 1880's, which removed the last element of physical strength needed in the spinning process.

The case of the few handloom weaving jobs retained by the woollen firm is also interesting since the number of such male

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<sup>45</sup>K. Stone, "The Origins of Job Structures in the Steel Industry," in R. C. Edwards, M. Reich and D. M. Gordon (eds.), Labour Market Segmentation (1973).

<sup>46</sup>Marwick, Economic Developments notes that 'Dundee notoriously became a centre of women's work and probably the only Scottish trade union where women predominated,' p. 145. Evidence for the lack of male spinners in Dundee linen production comes from a study of the manuscript census schedules of Dundee in 1851 made by Brenda Collins of the University of Edinburgh.

weavers was expanded during the decade 1871 to 1881, from 14 to 18 (see tables 4.2 and 5.2.) These weavers were of two distinct types: some were clearly bound for other jobs since six of these weavers were all only 25 years old or younger; the remaining 12 were all over 40 years of age, often heads of household, and frequently the fathers of those 'daughters' employed in the mill. Hence it may have been that the increase in handloom weaver numbers was due less to their position of strength in the work process, and more to their kinship relationship to the expanded category of unmarried women workers. While the retention of such adult male workers clearly represented a cost to the firm rather than a saving, such a situation seems plausible. The kind of internal labour market and job ladders described by Stone also involved extra costs that were accepted because of the stability of labour or extra control that they provided.<sup>47</sup> And it seems possible that a similar situation existed in the woollen firm, where management was concerned with moderating the effects of structural unemployment.<sup>48</sup>

This chapter has charted the changes in two firms that occurred during the mechanization of the main production processes. Such changes have been related to the general policy of management, namely to gain real control over the work process and to remove the artisan hand producers from their position of power in production. The process involved has been identified not simply as mechanization,

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<sup>47</sup>Stone, "Origins of Job Structures," in Edwards, Reich and Gordon, Labour Market Segmentation. Stone does not however lay much stress on the extra cost to the firm of the new job structures.

<sup>48</sup>Information on ages and family relations comes from the wage book/census linkage of Ballantyne's 1881. Information on unemployment of household heads in Walkernburn will be provided in chapter 6, table 6.6.

but more importantly as the redivision of labour. And this new division of labour was seen to have had significant impact on many different aspects of social life.

In the first place, it has been stressed in this study that the new complexity of occupations that emerged as a result of the redivision of labour, cannot be understood as the result of the operation of an abstract principle of differentiation. On the contrary, it is better understood as the outcome of the purposive actions of social agents, in this case management and labour. The fact that differentiation is not the inevitable result of mechanization and increased size was revealed in paper making where the number of distinct occupations was seen to have been reduced and simplified - the opposite of differentiation.

The process whereby labour was redivided, that is the mechanism through which the new occupational structure was created, was a *composite of different elements*. Management's own policies were *multifaceted*: they contained both cost savings, but included *also* many cost raising features, such as new kinds of clerical and supervisory workers, and increased pay differentials for certain occupations.<sup>49</sup> The results of this internal conflict within managerial policy were further confused as a result of opposition from certain groups of workers, such as the spinners and the weavers, who in different ways, successfully delayed the de-skilling of their jobs.

But just as we noted in chapter 4 that gains by labour were limited and the fact of the introduction of machinery was a defeat for artisan labour, so it will be argued here that the redivision of

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Managerial policy can be seen as united in the more general objective of 'valorisation.' See Brighton Labour Process Group "Capitalist Labour Process," p. 16.

labour was, on the whole, successfully carried out by management. And it remains to consider how the costs of this defeat were borne by labour in its varied occupational and familial aspects.

One way of measuring labour's defeat as a result of the redivision of labour is to see the extent to which the tendency to homogenization and equalization of working conditions was reversed by management's imposition of a hierarchical mode of control over the work process. This contrast can be presented as follows. The tendency towards greater homogeneity amongst the work force came from a number of factors grouped together under the term 'proletarianization.' Firstly, the size of the firms increased and more workers were concentrated together within the factory. Secondly, the process of de-skilling involved the reduction of handicraft skills to simple machine minding tasks, thereby making most jobs similar in skill level. Thirdly, common conditions of discipline and control by authority were created by the integration of workers into a complex collective process of production. (In more technical terms this was the socialization of work, the creation of the 'collective worker.')

The results for management can therefore be seen in the prevention of this proletarianization from turning into homogenization of labour (which might then have made collective organization against capital much easier.) In fact, the exploitation of social divisions within the work force and the creation of new kinds of labour in effect provided the political, that is the social control, significance of the redivision of labour. Such divisions resulting from the creation of new kinds of work include the distinction between conception and execution, or between mental and manual labour as it has less accurately been called, with the resulting

creation of clerical and managerial workers.<sup>50</sup>

Not only did management create distinctions based upon control over the direct production process, namely those paid for 'mental' work as clerks, and those paid for the exercise of authority as supervisors and foremen; but they also divided the 'manual' workers through a new age and sexual division of labour. In particular, the use of labour for only a part of the individual's life created a division in career possibilities within the firm, and for women workers the policy of management institutionalized the 'housewife' role.<sup>51</sup> Finally, the re-allocation of work within the firm meant that more men, especially labourers, were working in a situation of close contact at work with young women workers, and this it has been suggested, may have altered the status comparisons they made.

Divisions within the workplace did not exhaust the implications of the redivision of labour. The paternalist owners of the firms had an interest in the maintenance of order within the community at large as well as within the walls of their factories. And for the workers the translation of divisions within the firm into divisions in wider social life (for example, in terms of standard of living) had important implications for the formation of class structure. In order to examine these questions we must look at workers in the sphere of reproduction of labour, that is we must examine the family life of factory workers and the community in which they lived.

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<sup>50</sup>Brighton Labour Process Group, "Capitalist Labour Process," p. 17.

<sup>51</sup>See A. Oakley, Housewife (1974), chapter 3.

The aim of this chapter is to investigate the extent to which the new division of labour within the firm was transferred into the community at large, and the changes in this transfer process produced by the independent action of the families of the workers involved. An examination of the resulting inequalities in standard of living permits evaluation of the gains and losses for the various categories of people in what has loosely been described as 'the working class.' It permits an estimate of the material differences that divided those of different age, sex and employment. The underlying question is this: given that the process of proletarianization did not create homogenization, did the material conditions of family life and reproduction of labour serve to strengthen these differences or transform them in new ways?

This study of the factory families will begin with a re-examination of differential labour participation, and will suggest that families responded with a pattern of differential migration that had important consequences for standard of living. Next, sources of variation in family standard of living will be examined, and it will be argued that fundamental differences existed between families with high-paid heads and other, thereby supporting a 'dual labour market' or 'labour aristocracy' interpretation of the situation. The consequent age and sexual division of labour resulted in patterns of employment and migration that were specific to particular stages of the life cycle and which show the close bond between age and sex specific roles in occupations and family life. Finally, the factory families will be examined in order to assess the extent to which the same individuals were privileged or



disadvantaged in different social spheres. By these means the various dimensions of work and family life reveal the potential bases of divisions within the working class.

In the previous chapter it was noted that the management of the firms decided, as a matter of policy, to alter the labour participation rates of various categories of their employees. Those persons removed from work under the policy of paternalism were principally children under 13 years and mothers of young children.<sup>1</sup> Such changes had many ramifications, and much of this chapter will be devoted to the reasons for, and effects of, this important change.

The first problem is in establishing the extent of the change in labour participation that was actually produced by this new policy. Table 5.5 showed the changes occurring within the firms, which did indeed show a reduction in the proportion of wives employed. The most important change was, however, the huge increase in the proportion of daughters employed, who in the woollen firm constituted 40 percent of the entire work force. It was suggested that these two changes were functionally related, and that it was only through an increased utilization of life-cycle-stage specific labour, that an increase in female labour could be achieved at the same time that married women were largely excluded. It can therefore be seen that the managerial policy of paternalism at the same time as it systematized the life cycle stage specific exploitation of labour it also institutionalized the corresponding role of full time 'housewife.' Some of the implications of this argument will be examined in more detail below.

However, in order to estimate the labour participation

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<sup>1</sup>See especially the statement of Cowan's manager quoted on p. 111.



ratios for all of a particular category of people, an attempt must be made to define the population of potential employees for the firms concerned. This is no simple matter, and the solution adopted was chosen because of its ability to reveal the role of the firms in providing the livelihood of a local population. After considering possible alternatives, it was decided to include all members of families which received all their income from the firm. Also included are fractional proportions of all people in other households, in proportion to the share of income from the firms in question, compared with the total family income.<sup>2</sup> The resulting labour participation ratios are given in table 6.1.

The changes in the labour participation ratios for the whole population supported by the firm shown in table 6.1 confirm the impression given by the earlier table (5.5) which gave relationships to head of household within the firm. The decrease in the employment of wives was dramatic in the woollen firm's households, for whereas before mechanization, 23 percent of all wives worked, afterward only 7 percent of wives worked. While the proportion of working wives in the earlier period in the paper firm is not known, it may well have been higher than in wool since the total proportion of female

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<sup>2</sup>The method of calculation of the population that was supported by each firm as follows: if the family received all its income from the firm, all the family members were put in the total population analysed - these were the unambiguous cases. In households where only part of the total family income was derived from the firm studied, inclusion of just those persons receiving income from the firm would bias participation upwards. The solution adopted was as follows: if the family derived half its income from the firm, then 'half a person' of each type existing in that family was added to the population frequency totals.

workers was 10 percent higher.<sup>3</sup> However, the proportion of working wives remained as high as one fifth in the paper firm's households.

The other change involved in the policy of paternalism was the exclusion of children under 13 years of age. This can be seen to have been very low, even in the earlier period. The paper firm's policy is particularly interesting since paper manufacture was not regulated by the Factory Acts until 1868, and this policy of excluding children was said to have been in effect for the previous twenty five years or more.<sup>4</sup> Similarly, confirming the picture obtained inside the firms, the participation of young unmarried women increased, as can be seen from the increase in daughters thirteen years and older employed.

Such labour participation ratios are, of course, dependent upon the characteristics of the local population, and it was in this respect that the family as a collective unit underwent an important change. It has already been stressed that selective migration was an important new feature of the post-mechanization social structure. More remarkable than the changes in the labour participation rates of the locally present population, was the change in the proportions of different types of people who were locally resident. Selective migration skewed the local population so as to maximize the proportions of those most readily employed, chiefly young unmarried women. Such changes in the sex ratios of the population supported by the firms are given in table 6.2.

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<sup>3</sup>Sex of workers can be determined by the names that appear in the earlier Cowan wage books, while a more detailed breakdown by age and relationship to head of household is not possible without linkage to the census.

<sup>4</sup>For the Factory Acts and the 'humanitarian motives' of Cowan & Co., see D. C. Coleman, The British Paper Industry, 1495-1860 (1958), pp. 293 and 313.

TABLE 6.1: PERCENTAGE LABOUR FORCE PARTICIPATION BY SEX AND RELATIONSHIP TO HEAD OF HOUSEHOLD, FOR ALL PERSONS DEPENDENT ON THE FIRM, BALLANTYNE'S 1851 AND 1881, AND COWAN'S 1851.

Relationship to Head of Household	<u>Male</u>			<u>Female</u>			<u>All</u>		
	<u>Wool</u>		<u>Paper</u>	<u>Wool</u>		<u>Paper</u>	<u>Wool</u>		<u>Paper</u>
	Before (1851)	After (1881)	After (1851)	Before (1851)	After (1881)	After (1851)	Before (1851)	After (1881)	After (1851)
	%	%	%	%	%	%	%	%	%
<u>Head</u>	100	94	96	79	29	69	96	82	88
<u>Spouse</u>	-	-	-	23	7	21	23	7	21
<u>Child 13+</u>	90	93	80	77	91	95	84	92	92
<u>Child &lt;13</u>	8	2	2	2	1	2	5	1	2
<u>Other</u>									
<u>Relative</u>	91	83	89	75	49	66	85	57	72
<u>Lodger etc.</u>	100	100	100	100	86	100	100	96	100
<u>All</u>	64	63	59	30	43	46	46	52	52

Source: Wage book/census linkages Ballantyne's 1851 and 1881, Cowan's 1851.

Note: For definition of population included in the calculation of these labour participation ratios see p. 126 and footnote 2.

TABLE 6.2: SEX RATIO OF POPULATION DEPENDENT ON THE FIRM, BY RELATIONSHIP TO HEAD OF HOUSEHOLD, BALLANTYNE'S 1851 AND 1881, AND COWAN'S 1851.

			<u>Male</u>		<u>Female</u>		<u>All</u>	
			%	(n)	%	(n)	%	(n)
<u>Head</u>	<u>Wool</u>	Before	81	(26)	19	(6)	100	(32)
		After	81	(100)	19	(23)	100	(123)
	<u>Paper</u>	After	69	(98)	31	(44)	100	(142)
<u>Spouse</u>	<u>Wool</u>	Before	-	(0)	100	(25)	100	(25)
		After	-	(0)	100	(92)	100	(92)
	<u>Paper</u>	After	-	(0)	100	(90)	100	(90)
<u>Child 13+</u>	<u>Wool</u>	Before	52	(12)	48	(11)	100	(23)
		After	33	(77)	67	(155)	100	(232)
	<u>Paper</u>	After	39	(53)	61	(84)	100	(137)
<u>Child &lt;13</u>	<u>Wool</u>	Before	45	(25)	55	(31)	100	(56)
		After	52	(115)	48	(106)	100	(221)
	<u>Paper</u>	After	52	(110)	48	(103)	100	(213)
<u>Other Relative</u>	<u>Wool</u>	Before	67	(4)	33	(2)	100	(6)
		After	26	(6)	74	(17)	100	(23)
	<u>Paper</u>	After	28	(10)	72	(26)	100	(36)
<u>Lodger etc.</u>	<u>Wool</u>	Before	50	(2)	50	(2)	100	(4)
		After	72	(36)	28	(14)	100	(50)
	<u>Paper</u>	After	40	(16)	60	(24)	100	(40)
<u>All</u>	<u>Wool</u>	Before	47	(69)	53	(78)	100	(146)*
		After	45	(334)	55	(407)	100	(741)
	<u>Paper</u>	After	44	(287)	56	(371)	100	(658)

Source: Wage book/census linkages Ballantyne's 1851 and 1881, Cowan's 1851.

Note: Frequencies marked (\*) do not add correctly across rows due to rounding. For explanation of these fractional frequencies see p. 126 and footnote 2.

A balanced or 'standard' population might be expected to have about equal numbers of either sex due to natural fertility.<sup>5</sup> The presence of children under thirteen years in all the households studied confirms this expected pattern (see table 6.2.) By contrast, however, children thirteen and older were strongly skewed in their sex distribution; in the case of the families dependent on the woollen firm, female children were so over-represented as to constitute two thirds of all children of working age in the period after mechanization. A more balanced population of children of working age appears to have been supported by the woollen firm in the earlier period, there being close to equal numbers of either sex. A similar skewed pattern appeared in the case of the paper firm, which also had a strong bias towards female children of working age in local households, after the firm had mechanized and re-divided labour.

The explanation of such systematic bias in the population that was supported by the firms studied is a complex matter. As we shall see subsequently, this had a strong occupational association. In particular, it has been suggested that the extra female children were the daughters of low paid workers, and that this had profound implications for careers, life course and standard of living. It can be concluded that the population dependent on the firms for their livelihood was skewed so as to fit with the age and sexually specific division of labour within these firms. And this action of migration by families can be seen both as a adaptive strategy for the families concerned and as a source of transformation of the

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<sup>5</sup>For definitions and use of 'standard populations' in historical demography see for example M. Drake, Historical Demography: Problems and Projects (1974), p. 30.

structure of inequality: each family made its own welfare calculation in terms of its particular family economy, but the result when combined with migration decisions meant that the structure of reward inside the firms was not transferred directly into the community with the same structure of inequality appearing in social life outside of firms.

The implications of the new demographic shape of the population dependent on the firms studied, can be seen most clearly in relation to the standard of living that it produced for the families concerned. Standard of living has been defined in this research as total family income divided by the family's total personal needs. The latter was operationalized according to the scale of adult equivalent needs used by Foster, and derived from the poverty studies of Bowley, which was introduced in chapter 3.<sup>6</sup> In order to have an accurate estimate of the income of the head of household, only those households whose head worked in the firms studied were included in the detailed analysis that was made of standard of living. The alternative procedure is to estimate incomes for occupations and allocate the mean for that occupation to the head.<sup>7</sup> While such a procedure would have increased the number of families studied, it would have removed one of the chief benefits of the linkage of census household to the wage books, namely, the ability to use accurate wage information which varies within occupation.

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<sup>6</sup>See above chapter 3, p. 46 and A. B. Atkinson, The Economics of Inequality (1975), pp. 42-43; J. Foster, Class Struggle and the Industrial Revolution (1974), appendix 1, p. 256.

<sup>7</sup>For example, C. Goldin, "Female Labour Force Participation: The Origin of Black and White Differences, 1870 and 1880," in Journal of Economic History (1977), vol. 37, no. 1, esp. pp. 97-99.

Family standard of living was therefore the product of a number of different variables, which were frequently affected by the composition of the household. Family income was calculated for kinship related coresident persons, boarders and lodgers being excluded (except for the fixed element, they were considered to contribute to the families they lodged with<sup>8</sup>). Total family income was therefore dependent upon the demographic facts of the number of persons in the family, and secondly upon the labour force participation rates of these people. In a similar manner, the divisor of the family standard of living equation can vary as the number of mouths to feed varies in number and by age and sex.

Yet, in spite of all these potential sources of variation, there emerge from the literature two fairly clear, and in some ways opposite, models of the determination of family standard of living. Because these two patterns can be placed in chronological order they relate to theories of the development of the modern industrial family and must be placed within this context.

Perhaps the best starting point is the work of Young and Willmott, whose notion of the 'symmetrical family' involves an explicit statement of the stages of development of the modern family.<sup>9</sup> While the main concern of their book is with changes in the twentieth century, this research concerns the period of the transition from their 'stage one' to 'stage two,' that is, from the symmetrical form in which all family members worked, to the asymmetrical form of family in which typically the adult male head was the sole breadwinner.

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<sup>8</sup>See Foster, Class Struggle and the Industrial Revolution, p. 256.

<sup>9</sup>M. D. Young and P. Willmott, The Symmetrical Family (1973), especially pp. 27-33 and chapter III.



The earlier form of symmetry seems most appropriate in the case of domestic outworkers rather than the peasant agriculturalists, and an interesting account of this full labour participation by the family is given by Medick.<sup>10</sup> On the other hand, the asymmetrical family of the second stage, located by Young and Willmott in the second half of the nineteenth century, fits much of modern sociological theory of the family with its emphasis on the single earner who as male head gives status to the family.<sup>11</sup> It might be expected from these theories that, during the period of this study, there would have been a change in family economics in the direction of asymmetry which, in this respect, follows the theme that the modern family structure emerged at the same time as the modern occupational structure.

A look at the actual determinants of family standard of living in the households associated with the firms studied, can reveal the extent to which either of the above types existed, and affords some insight into the direction of change. As previously noted, a study was made of all household heads who worked in the firms studied, this limitation being necessary in order to have accurate wage information about the head. And a simple ordinary least squares regression was done of head's income against family standard of living. Table 6.3 shows the correlation coefficients that were obtained.

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<sup>10</sup>H. Medick, "The Proto-Industrial Family Economy: The Structural Function of Household and Family During the Transition from Peasant Society to Industrial Capitalism," in Social History, no. 3 (1976), pp. 291-334.

<sup>11</sup>See refs. to Parsons and Harris in A. Oakley, Housewife (1976), pp. 32-33.

TABLE 6.3: COEFFICIENTS OF CORRELATION BETWEEN HEAD'S INCOME AND FAMILY STANDARD OF LIVING, BY OCCUPATIONAL LEVEL OF HEAD, FOR ALL FAMILIES WITH HEADS WORKING IN BALLANTYNE'S 1851 AND 1881, AND COWAN'S 1851.

<u>Head's Income Level</u>	<u>Wool</u>				<u>Paper</u>	
	<u>Before</u>		<u>After</u>		<u>After</u>	
	r	(n)	r	(n)	r	(n)
Higher Paid (male)	+0.9	(8)	+0.7	(38)	+0.4	(35)
Medium Paid (male)	-0.1	(17)	+0.7	(11)	-0.2	(23)
Labourer (male)	-	(0)	0.0	(33)	-0.2	(30)
Female Head	+0.3	(6)	+0.2	(7)	+0.5	(34)
All Heads	+0.6	(31)	+0.5	(89)	0.0	(122)

Source: Wage book/census linkages Ballantyne's 1851 and 1881, and Cowan's 1851.

Notes: 'Higher paid' is the residual male category after labourers and 'medium paid' have been removed. 'Medium Paid' in the woollen firm means male handloom weavers only; in the paper firm it includes those paid  $\geq 1.2$  and  $< 1.5$  times the labourer wage. Mean values of head's wages are given in table 6.5 below.

An examination of the relationship between head's income and family standard of living shows the extent to which the modern and 'industrial' pattern of family economics existed. In the case of the woollen firm a moderate positive correlation was found between head's income and family living standard,<sup>12</sup> this being true for both periods of time, while in the paper firm there was no association at all when all employed heads are considered.

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<sup>12</sup>The levels of the correlation coefficients reported are intended to be considered as general indications only, and their magnitudes are described as 'strong positive,' 'moderate positive,' and 'no association' (and similarly with negative relationships). In other words, only the sign and approximate magnitude are considered significant.

However, the overall correlations are affected by the composition differences between the two firms in the proportions of different kinds of heads they employed. As can be seen from table 6.3, the relationship varied greatly with the occupation of the head.

The asymmetrical family income pattern, and the one presented by sociological theorists of the modern family, predicts that head's income determines family standard of living. There is evidence suggesting that this was the case for the higher paid male heads of household at both periods in the woollen firm, and to a lesser extent for the top wage earners in the paper firm. When contrasted with the non-existent or negative relationship between head's income and family standard of living that was the situation of labourers in relation to their families, there is *prima facie* evidence for the existence of a labour aristocratic situation. In this, there was a marked contrast between the different groups of workers in their family and labour reproduction situations. The apparently aberrant situation of the female headed households, which also displayed a positive association between head's income and family living standard, was the result of very different household composition. While such an association was generally low, it can be explained, as will be seen subsequently, by the fact that female headed households had very few dependents.

As was first noted in chapter 5, the low paid labourer headed households were operating under different structural conditions in their family economy. To the extent that they were governed in their family standard of living by the symmetrical employment situation of Young and Willmott's 'stage one,' we would expect that living standards were determined by the proportion of

family members employed. This idea was operationalized as the number of earners minus the number of dependents in the family, with persons being measured in terms of their 'needs.'<sup>13</sup> The resulting measure is the excess of earners over dependents in the family, and as can be seen in table 6.4, this variable does indeed explain the variation in living standards of labourer headed families better than did the income of household head.

TABLE 6.4: COEFFICIENTS OF CORRELATION BETWEEN 'EXCESS OF EARNERS OVER DEPENDENTS' AND FAMILY STANDARD OF LIVING, BY OCCUPATIONAL LEVEL OF HEAD, FOR ALL FAMILIES WITH HEADS WORKING IN BALLANTYNE'S 1851 AND 1881, AND COWAN'S 1851.

<u>Head's</u> <u>Income</u> <u>Level</u>	<u>Wool</u>		<u>Paper</u>
	<u>Before</u>	<u>After</u>	<u>After</u>
	r (n)	r (n)	r (n)
Higher Paid (male)	+0.6 (8)	+0.4 (38)	+0.3 (35)
Medium Paid (male)	+0.7 (17)	+0.4 (11)	+0.7 (23)
Labourer (male)	- (0)	+0.7 (33)	+0.6 (30)
Female Head	+0.3 (6)	+0.2 (7)	+0.1 (34)
All Heads	+0.4 (31)	+0.3 (89)	+0.5 (122)

Source: As for table 6.3.

Note: Definition of 'excess of earners over dependents' is; total needs of earners minus total needs of dependents. For variable means see table 6.5 below.

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<sup>13</sup>This indexing relates to the idea raised in chapter 3 that pay for non-artisans was proportional to conventional needs and to the individual's consumption status within the family.

It is clear from table 6.4 that the facts of family composition, specifically the number of people of working age, and the extent of labour force participation, were far more important in the standard of living of labourer-headed families than was the income level of the head. Such labourer-headed households were a quarter of all households with heads employed in the paper firm in 1851, and the proportion was even higher in the woollen firm, being 37 percent in 1881. It must therefore be concluded that a large proportion of the households dependent on the firms were, even after mechanization, governed in their family living standards by the 'pre-industrial' pattern of multiple earners in the family, rather than by the 'industrial' pattern of asymmetrical employment and its consequent determination of family status via the head's own income.

The demographic based facts of multiple earners did, of course, influence heads with occupations other than labourer. This association was, however, only a low positive correlation in the case of the top income earning heads, and was virtually non-existent in the case of female headed households. However, following the same pattern as the labourers, the medium paid in the paper firm were also strongly positively associated in their family standard of living, with the excess of earners over dependents in their families. This was also the case with the handloom weavers, the largest group of household heads in the woollen firm before mechanization.

Having suggested major differences in the sources of variation in family living standards and having related these to two causal variables, some further insight can be gained into the workings of these different mechanisms by a look at the mean values of the variables concerned. These appear in table 6.5 and show,

first of all, that the incomes of heads of household follow the pattern expected from the study of the firm in chapter 5. The top paid males in the woollen firm had the highest 'differential' (2.1 times the labourer wage), and women in the woollen firm after mechanization had a higher wage (0.9) than in the earlier period.

TABLE 6.5: MEAN VALUES OF THREE VARIABLES USED IN THE FAMILY STANDARD OF LIVING STUDY, BY OCCUPATIONAL LEVEL OF HEAD, FOR ALL FAMILIES WITH HEADS WORKING IN BALLANTYNE'S 1851 AND 1881, AND COWAN'S 1851.

<u>Head's Income Level</u>	<u>Wool</u>						<u>Paper</u>		
	<u>Before</u>			<u>After</u>			<u>After</u>		
	1	2	3	1	2	3	1	2	3
	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$
Higher Paid (male)	1.8	0.9	+0.1	2.1	0.8	-0.2	1.7	0.8	+0.1
Medium Paid (male)	1.3	0.6	+0.7	1.4	0.7	+1.1	1.3	0.6	-0.3
Labourer (male)	-	-	-	1.0	0.6	+1.0	1.0	0.6	+0.5
Female Head	0.6	0.5	+1.2	0.9	1.0	+1.2	0.6	0.8	+1.5
All Heads	1.3	0.7	+0.6	1.5	0.7	+0.5	1.2	0.7	+0.5

Source: As in table 6.3 and 6.4.

Notes: In columns 1=head's income in labourer wage units. 2=family standard of living in labourer wage units per adult equivalent need; 3=number of earners minus number of dependents in the family in need units.

A comparison of the average standard of living for the various occupational groups reveals some interesting contrasts. While it was true that the higher paid heads had a higher than average standard of living in their families, living standards did not decline consistently with the lower paid heads. This was

evident in the fact that the medium paid were not better off than the labourers in the paper firm. But most dramatically, it was found that female headed families in both firms after mechanization, had a standard of living that was on average equal to that of the highest paid male headed families. Such a finding is especially important in the case of the paper firm, where 28 percent of all heads in the firm were female (see tables 6.4 and 6.5).

The reason for this reversed relationship between income of head and family living standard when the occupational means are compared, is revealed by the values of the third variable in table 6.5, namely, the excess of earners compared with dependents in the families. Whereas, on average, in all families, there was the equivalent of half an adult male more earners than dependents in the households, the high living standards seen in female headed households, were due to the fact that these had, on average, 1.2 to 1.5 (adult male equivalents) more earners than dependents. In other words, female headed households had a high rate of labour force participation, and very few dependents in their families. At the opposite end of the scale, the medium paid in the paper firm were relatively poorly off because they had more dependents than earners (-0.3 adult male equivalents).

It is now possible to summarize the conditions under which the firms studied were able to obtain the supply of cheap labour that they required, despite the restrictions that they had placed upon themselves in the use of potential workers by their policy of paternalism. Both firms were able to employ workers from families that contained disproportionately large numbers of individuals of the age and sex character that they wanted. The study of age and sex skew in the populations dependent on the firms, shows this



effect very clearly (table 6.1 and 6.2). However the precise mechanisms whereby the woollen and paper firms achieved this end differed, and these will be examined next. But in both cases the results were similar in some important dimensions: firstly, the new employment policies of the firms had major effects on the distribution of the costs of reproduction of labour over the full life cycle of families; secondly, such costs and local living standards had an important influence in transforming the way that inequalities within the firm, originating in the labour process, were transmitted beyond the firm into the social life of the community; and thirdly, the pattern of induced life cycle stage specific migration produced different coping strategies within families and with the creation of the full time 'housewife' a new allocation of family roles.

Since women were the largest category of cheap labour employed in both firms, we can usefully examine some differences between the firms in their supply of cheap labour by looking at the family backgrounds of women workers. This is done in table 6.6 which shows the occupation of the household head of all women employed.

TABLE 6.6: EMPLOYMENT AND SEX OF HEADS OF HOUSEHOLD OF ALL FEMALE WORKERS IN BALLANTYNE'S 1851 AND 1881, AND COWAN'S 1851.

<u>Employment</u>	<u>Occupation and Sex</u>	<u>Wool</u>		<u>Paper</u>	
		<u>Before 1851</u>	<u>After 1881</u>	<u>After 1851</u>	
		% (n)	% (n)	% (n)	
<u>Not Employ- ed</u>	<u>Male</u>	- (0)	6 (11)	0 (1)	
	<u>Female</u>	19 (5)	23 (41)	19 (42)	
<u>Employ- ed in Differ- ent Ind- ustry</u>	<u>Artisans</u>	- (0)	5 (9)	22 (48)	
	<u>Agricult- ure</u>	8 (2)	7 (12)	8 (18)	
	<u>Other Labourers</u>	12 (3)	1 (2)	6 (13)	
<u>Employ- ed in Same Ind- ustry</u>	<u>Higher- Paid Male</u>	12 (3)	6 (11)	10 (23)	
	<u>H.L.W. (Male)</u>	27 (7)	12 (22)	N.A. (*)	
	<u>Labourer Male</u>	- (0)	34 (61)	8 (18)	
	<u>Female</u>	23 (6)	7 (13)	26 (57)	
		101% (26)	101% (182)	99% (220)	
<u>Not linked</u>		5	14	17	
<u>Total Females</u>		(31)	(196)	(237)	

Source: Wage book/census linkages Ballantyne's 1851 and 1881, Cowan's 1851.

Notes: "Same industry" means woollen industry, employed head in case of woollen employed females; similarly "same industry" means paper employed head of household for paper employed females. All those heads employed in "different industries" were empirically found to be all male.

The first aspect of the households that supplied cheap female labour to the firms, a feature which is evident from table 6.6, was that uniformly about a fifth of all women workers came from households with unemployed female heads. Female headed households

were therefore important throughout this period. Male unemployment was only significant in Walkerburn (1881), these men being mostly ex-handloom weavers;<sup>14</sup> in the other places men always reported an occupation.

The main difference that shows up between the woollen and the paper firm, was in the fact that the woollen firm drew so many of its women workers from labourer-headed households, whereas in the paper firm, the most important sources of female labour were working women heads and those households headed by artisans. The reason for the large proportion of artisan headed households sending women to work in the paper mill, was due to the comparatively diversified occupational and industrial structure of Penicuik, which contrasted with the single industry employment available in Walkerburn. The Penicuik artisans were small manufacturers and tradesmen who had little employment for their daughters, or certainly none that could provide such a good income as work in the paper mill.<sup>15</sup>

By contrast, the woollen firm appears to have attracted an adequate supply of women workers by employing the male heads of families with co-resident daughters at labourer wage jobs. The woollen firm after mechanization had very few working women as head of household, which was in line with the paternalist policy of excluding most married women. However, the paper firm continued to take a quarter of its women workers from houses where the head was

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<sup>14</sup>Out of the 11 workers from unemployed male headed households, 3 were specifically identified as 'unemployed weaver' headed. It is probable from the age characteristics that many or most of the other unemployed males were also formerly weavers.

<sup>15</sup>These artisans include nailer, saddler, mason, carter, grocer and flesher (butcher). However the largest single occupation, supplying 12 women workers, was that of tailor, possibly a depressed and marginal employment at this time.

female and working. Some of these were women employed by other mills in the neighborhood, which were not as 'enlightened' as Cowan's with respect to employing married women. The bulk were, however, women without husbands, being either widows or women recorded in the census as 'wife' but who had no co-resident husband. It appears from the large number of women workers in Cowan's who came from such households, and from the significant numbers of 'wives' and female heads of household employed by Cowan's (together 60 workers, or 16 percent of the linked workers - see table 5.5), that such women without spouses and their families were attracted to the Cowan Mills in disproportionately large numbers.<sup>16</sup>

It has been noted that in one important respect the results of the employment practices of the two firms were the same, whether, like the woollen firm, the most important source of cheap labour was derived from male labourer-headed households, or whether, like the paper firm, such labour came from female headed households or from those of (possibly declining) artisans. The important way in which both firms were similar was that they both derived their low-paid female labour from households that were not bearing the economic burden of supporting dependent children. At least such was the tendency amongst the kind of households that each typically

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<sup>16</sup>The fact that a total of 45 percent of all female workers in the paper firm came from female headed households (table 6.6) strongly suggests that selective migration was at work here, although more rigorous proof of this would require knowledge of the demographic characteristics of a large sample of the population of Scotland. However, support for the theory that selective migration supplied the extra female headed households, comes from Anderson's study of Preston, Lancs. households, which were 18 percent female headed (Family Structure in Nineteenth Century Lancashire [1971], table 10, p. 46). While not strictly comparable, table 6.2 above suggest that the paper firm supported households that were 31 percent female headed - a substantially larger proportion, that was probably due to selective migration.

employed most.

These important differences can be seen in table 6.7 which gives the percentages of households that had at least one dependent child over a year old, and which had under half of their children employed. These conditions identify those households which were in the family life cycle stages that were relatively the poorest due to the presence of young and dependent children.<sup>17</sup> Table 6.7 shows that the higher paid factory workers consistently, in over 60 percent of their families, supported dependent children, whereas the proportion of families carrying out this necessary function shows a clear pattern of decline with the declining income of the head of household. Thus of the two categories of household that were most important to the firms as sources of female labour, the labourer heads in the woollen firm show the lowest rate of support of dependent children (29 percent). The female headed households in the paper firm have an even lower proportion with dependent children (only 15 percent - see table 6.7).

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<sup>17</sup>For an analytical use of 'life cycle stages' in the study of the family, see Anderson, Family Structure, esp. definition in note p. 202. Life cycle stages used in table 6.7 below correspond to Anderson's L.C.S. 3 and 4. For evidence of the continuing relationship between life cycle and poverty, see A. B. Atkinson, The Economics of Inequality (1975), pp. 198-202.

TABLE 6.7: PERCENTAGE OF FAMILIES WITH DEPENDENT CHILDREN (NONE OR LESS THAN HALF EMPLOYED), FOR ALL FAMILIES WITH HEADS WORKING IN BALLANTYNE'S 1851 AND 1881, AND COWAN'S 1851.

	<u>Wool</u>		<u>Paper</u>
	<u>Before</u>	<u>After</u>	<u>After</u>
	% (n)	% (n)	% (n)
Higher Paid (male)	63 (5)	65 (24)	69 (24)
Medium Paid (male)	53 (9)	36 (4)	74 (17)
Labourers (male)	- (-)	29 (10)	47 (14)
Female Head	33 (2)	.. (0)	15 (5)
All Heads	52 (16)	43 (38)	49 (60)
(N=100%)	(31)	(89)	(122)

Source: Wage book/census linkages Ballantyne's 1881 and 1851, and Cowan's 1851.

Note: For definition of 'dependent children' see p. 144 and footnote 17.

The conclusion that can be drawn from the study of dependence within households as it varies between occupational groups is the same as that suggested earlier by the excess of earners over dependents shown in table 6.5. The situation was this: that the burden of support of children was very unevenly distributed amongst the households associated with the firms studied, the higher paid heads carrying much more of this burden than the lower paid heads of household. Now, while this had a short-term consistency for the families concerned, it had longer term consequences for the firm in terms of the costs of its labour, and for the families, important implications for careers and for life course as a whole.

Considered firstly from the point of view of the firm, it can be seen that the significant feature of the redivision of labour was that it expanded those categories of employment that were recruited in a new way: specifically, the labourers and women workers whose employment was so characteristic of the post-mechanization occupational structure, were drawn from families that were not bearing the costs of supporting dependent children. This had a number of important consequences. Most importantly, the firm got its supply of cheap labourer-wage male, and even lower paid female labour, but it did so without having large numbers of low paid and hence poverty-stricken families in the locality. It is at this point that we can see the other side, or the deeper meaning, of the policy of 'paternalism;' for by excluding married women from employment, the employers ensured that low income heads of household could not support their families through the 'poverty' life cycle stages in which there were young children.

It can be seen therefore, that far from creating poverty by employing more low paid workers, the paternalistic firms studied had female headed families with a standard of living on average as high as any (see table 6.5), and labourer-headed families that were often as well off as the medium paid workers. The managers of the firms therefore contrived to get the best out of two contradictory tendencies: they got cheap labour for themselves, together with the social stability created by higher than expected local living standards.

As it affected the workers and their families, the inability of labourer-wage men to live throughout their family life cycle in these paternalist company villages had at least two important consequences. Firstly, their careers inside the firm were dependent



upon the facts of departure from the area for much of their working life. As a result, it seems that employers therefore found it easier to remove such occupations from any 'job ladder' and promotion path. In this way the intimate relationship can be seen between the creation of non-promotional permanent 'labourer' jobs by the management in their redivision of labour on the one hand, and on the other hand, the new mode of life cycle stage specific employment of men and women. Both new policies worked together and reinforced each other. It can thus be seen that the dilution of male labour by female labour, particularly in the woollen firm, not only created low paid non-promotional jobs for women, but also resulted in the dilution of more male labour through the creation of low paid non-promotional labourer jobs for the fathers of these young women.

The second area in which these new managerial policies had major impact is on the strategy and timing of the decisions that families made, with respect to employment and migration. Some suggestions can be made as to constraints operating upon these families.<sup>18</sup> For instance, it seems that labourer-headed households had to seek other areas of work during their years with many dependent children. This was because the paternalist policy did not permit the wife of a labourer to work, and other areas probably permitted a better relationship of earners to costs for these poor families.<sup>19</sup> Many questions remain unanswered in this area, for

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<sup>18</sup>A full study of the life-course of families is difficult to achieve with cross-sectional data like the censuses. And even those studies that are possible would be well beyond the scope of this study and require a different research design.

<sup>19</sup>The better economic situation of labourers families may have been due to a) non-paternalist employers permitting the wife to work, or b) husbands finding more arduous or dangerous jobs that paid slightly more or c) house rents being lower than in company housing in the mill villages. In any case this would be an interesting area for future research.

example the kinds of strategies developed by labourer and female headed families to cope with the changing employment possibilities over their family life cycle. But the results were clear enough. The effect of the policy of enlightened paternalism was to ensure that those who were lowest paid and in their poorest stages of the life cycle, could not afford to live in these mill villages where such a policy operated. The result of paternalism was therefore to produce higher local living standards by dint of exporting poverty to other areas.

At this point it may be noted that there exist important limitations in the available knowledge of the employment and migration experiences of the families in this study. It is certainly not possible to know where the families went after they left the firms, through the limitations of the information in the census. And while some inferences can be drawn from analysis of the birthplaces of family heads and their children, a major study of migration patterns was considered beyond the scope of this study.<sup>20</sup>

However, as with the study of the birthplaces of handloom weavers in chapter 4, some information on migration and possible earlier employment can be obtained. The industrial character of the birthplaces of all heads of household employed in the two firms, distinguished for the main occupational groups, is presented in table 6.8.

Although the cell frequencies are not large, there was a consistent propensity for lower paid workers to come from occupational

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<sup>20</sup>Retrospective analysis of migration using birthplaces of family members has been done by Anderson, Family Structure, pp. 34-41. The future migration of families is, of course, impossible to obtain by this method.

backgrounds outside the industry of their current employment. For example, in the woollen mill in 1881, nearly 60 percent of higher paid household heads were born in parishes where woollen textiles were made, whereas only a quarter of labourer wage workers came from such woollen textile areas. The pattern was less marked in the paper firm, but still visible is the greater likelihood of high paid paper workers being born in paper making areas. The parish of birth and the industrial sector of employment in that area permit the creation of what is admittedly a fairly crude measure of the previous employment of an individual.<sup>21</sup> This measure may work less well in the more occupationally diverse Midlothian area in which the paper mill was situated, and hence show fewer unskilled paper workers originating in agriculture than was actually the case. Where there was less diversity as in Peeblesshire and the Borders, the use of parish of birth as an indicator of employment in either agriculture or textiles is probably more reliable.

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<sup>21</sup>If paper making or textile making were carried on in a particular parish then all persons born in that parish were considered to have had employment experience in that industry: any source of error here being likely to over-estimate prior experience in the paper and woollen industries. 'Agricultural' parishes were so called if no manufactures or industry were present in the parish; it is clear, however, that nearly all parishes had some agricultural employment, and hence this indicator may under-represent agricultural origins. This latter bias is probably more than compensated for by the inclusion of all untraced birthplaces in the agricultural category. See also notes to table 6.8.

TABLE 6.8: INDUSTRIAL CHARACTER OF PLACE OF BIRTH AND OCCUPATIONAL LEVEL OF HEAD, FOR ALL HOUSEHOLDS WITH HEADS WORKING IN BALLANTYNE'S 1851 AND 1881, AND COWAN'S 1851.

Occupation of Head	Before			After			Paper		
	Wool %	Other Non-agric. %	Agric. %	Wool %	Other Non-agric. %	Agric. %	Paper %	Other Non-agric. %	Agric. %
Higher	50 (4)	13 (1)	38 (3)	57 (21)	14 (5)	30 (11)	60 (21)	20 (7)	20 (7)
Medium	41 (7)	47 (8)	12 (2)	55 (6)	36 (4)	9 (1)	57 (13)	26 (6)	17 (4)
Labourer	- (-)	- (-)	- (-)	26 (9)	32 (11)	41 (14)	47 (14)	33 (10)	20 (6)
Female	33 (2)	17 (1)	50 (3)	14 (1)	43 (3)	43 (3)	50 (17)	35 (12)	15 (5)
All	42 (13)	32 (10)	26 (8)	42 (37)	26 (23)	33 (29)	53 (65)	29 (35)	18 (22)

Source: Wage book/census linkages Ballantyne's 1851 and 1881, and Cowan's 1851. Occupational information on place of birth from Chambers' The Gazetteer of Scotland (1844).

Note: 'Wool' includes any wool or textile manufacture in parish of birth; 'paper' includes any paper manufacture in parish of birth; 'agricultural' means no other industry in that parish, and includes all birthplaces not traced in Chambers' Gazetteer; 'other non-agric.' is the residual category.

Over all, table 6.8 shows that labourer headed households had slightly less employment experience in their industry of current employment, but this does not mean that they were raw agricultural recruits to the new factory labour force. Only a minority of labourers came from agricultural employment areas (even under the assumption that all untraced birthplaces were in fact agricultural). And much of the difference in employment experience in comparison with the highly paid workers was due to the labourer's greater participation in a variety of other non-agricultural employments. A more detailed study of migration patterns, and hence by inference also employment, using the birthplaces of co-resident children, would clearly supply interesting additional information on the process of life cycle stage specific migration of labour headed households.

For the high paid workers, on the other hand, the new 'dual labour market' characteristics produced by the redivision of labour had the potential for turning into a complete 'labour aristocracy' situation.<sup>22</sup> However, it will be argued here that while this potential existed because of the different family economies of the high paid workers, such differences were not transmitted into two important areas of social life, namely education and property. It can be concluded that the material basis for a labour aristocracy did not harden into a distinct social stratum because some important aspects of non-work life were working against it.

In contrast to the pattern of high fertility and early

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<sup>22</sup>R. Q. Gray, The Labour Aristocracy in Victorian Edinburgh (1976), makes the important point that not every privileged section of workers is a 'labour aristocracy,' The cultural, and specifically the political, dimension must also be studied.

labour force participation which has been associated with low incomes,<sup>23</sup> the higher paid workers might have been expected to follow the alternative pattern which involved 'investing' more in a smaller number of children, particularly with respect to education. The latter has been claimed to be the strategy of those aspiring to upward mobility.<sup>24</sup> In fact, in the firms of this study, schooling beyond the age of usual entry into the factory seems to have been a relatively infrequent phenomenon as shown in table 6.9.

TABLE 6.9: PERCENTAGE LABOUR FORCE PARTICIPATION OF ALL CHILDREN 13+ YEARS OF AGE, BY SEX OF CHILD AND OCCUPATIONAL LEVEL OF HEAD, IN FAMILIES WITH HEADS WORKING IN BALLANTYNE'S 1851 AND 1881, AND COWAN'S 1851.

<u>Occup- ation of Head</u>	<u>Wool</u>				<u>Paper</u>	
	<u>Before</u>		<u>After</u>		<u>After</u>	
	Male % (n)	Female % (n)	Male % (n)	Female % (n)	Male % (n)	Female % (n)
Higher Paid (male)	100 (2)	- (0)	88 (7)	67 (8)	89 (17)	94 (16)
Medium Paid (male)	100 (7)	80 (4)	90 (9)	91 (20)	77 (10)	100 (8)
Labourers (male)	- (-)	- (-)	100 (18)	91 (42)	83 (5)	78 (7)
Female Head	50 (1)	83 (5)	100 (1)	100 (2)	100 (10)	92 (12)
All Heads	91 (10)	69 (9)	95 (35)	88 (72)	88 (42)	91 (43)
(N=100%)	(11)	(13)	(37)	(82)	(48)	(47)

Source: Wage book/census linkages Ballantyne's 1851 and 1881, and Cowan's 1851.

<sup>23</sup>For fertility strategies see L. A. Tilly, "The Family Wage Economy of a French Textile City, Roubaix, 1872-1906" (Paper presented to the Social Science History Association annual meeting, 1977).

<sup>24</sup>This is the approach of the 'human capital' economists.



Table 6.9 shows that labour force participation by children of even the higher paid workers was very high, only about 10 percent of children not working once they had reached thirteen years of age. This suggests that there was very little emphasis placed upon academic attainment and advanced learning skills. It seems probable that occupational achievement was perceived even by the highest paid manual workers, as bound up with on the job training and apprenticeship to skilled production jobs, rather than as based upon educational qualifications and acquisition of white collar work. There was, however, a slight tendency for the higher paid heads to send their children to school, although the relationship was less clear in the paper firm. It is evident, however, that very few children in these communities were attending school past the age at which paid work could begin.<sup>25</sup>

If narrowly conceived 'economic' class was not transferred into 'social' class in the field of education, neither was such a process apparent in the holding of housing property. An attempt was made to link the individuals from the population listed in the census to the property valuation rolls of the parishes concerned.<sup>26</sup> The results suggest that property ownership, as distinct from renting, was a rare phenomenon even for the higher paid workers. Table 6.10 shows that only 6 percent of household heads in Ballantyne's 1881 owned their own houses, while in Penicuik, the Cowan heads of

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<sup>25</sup>A total of 1 male and 3 female children aged 13+, attended school in the Walkerburn 1881 workers sample; in Penicuik 1851 5 male and 1 female children attended school.

<sup>26</sup>The valuation rolls are mentioned in chapter 2. These records were collected systematically for Scotland after the years 1855-56. Relationship to the property as either owner or tenant was given, together with a valuation of the building occupied, usually a fixed proportion of its annual rental value.



household owned their houses in only 2 percent of the cases. It is therefore clear that if property ownership in housing was a significant phenomenon of social division in the community, then the cut-off point which it produced did not coincide with that resulting from the different family economies of labourers and higher paid workers.

TABLE 6.10: PROPERTY OWNERSHIP (LINKAGE TO VALUATION ROLL) BY OCCUPATIONAL LEVEL OF HEAD, FOR ALL HOUSEHOLDS WITH HEADS WORKING IN BALLANTYNE'S 1881 AND COWAN'S 1851.\*

	<u>Wool</u>			<u>Paper</u>		
	Percentage of all in that Occupa- tion Owning Property		Percen- tage of all Owners	Percentage of all in that Occupa- tion Owning Property		Percen- tage of all Owners
	%	(n)	%	%	(n)	%
Higher Paid (male)	8	(3)	60	6	(2)	67
Medium Paid (male)	9	(1)	20	-	(0)	-
Labourers (male)	-	(0)	-	3	(1)	33
Female Head	14	(1)	20	-	(0)	-
All Heads	6	(5)	100	2	(3)	100

Source: Linkages from wage book/census Ballantyne's 1881 to valuation roll of Walk Turnbull 1881; linkages from wage books/census Cowan's 1851 to valuation roll of Penicuik 1855-56.

Note: \* The lower rate of property ownership found in Penicuik may be due in part to the fact that no valuation roll was available for Penicuik until four years after the census. However, labour turnover was lower in Cowan's than in Ballantyne's and house owners were probably the most stable and non-mobile element in the population. Under-estimation is therefore not likely to have been very serious.

It has been suggested that the education of children and house ownership did not reinforce, outside the firm, the material basis for a labour aristocracy created inside the firms. At the other end of the pay scale, the new division of labour inside the firms affected women in many ways that have already been noted, and this chapter will be concluded with a summary of the main aspects of these new conditions for women.

The increase in the proportions of women employed was a central feature of both firms during the periods of mechanization studied. Women workers increased their share of the work force by 10 percent in both firms, to reach 60 percent in the paper firm and 50 percent in the woollen mill. Despite the fact that the firms were mechanizing at this time, only the women weavers in the woollen firm worked powered machinery. All the other women were doing manual work that required dexterity and which was akin to the kind of work done by women in the outwork and 'sweated' trades.

The biggest single change during the period studied was the development by management of the practice of age specific employment, which was predicated upon the circulation of population that supplied labour to the firms. In this way the managers reduced their costs by avoiding having to support the working population throughout the whole of the life cycle. This managerial principle of differentiation therefore broke the community ties of long residency, possibly with the kind of consequences noted by Durkheim, although the specific human agency responsible for this change should be kept in mind.<sup>27</sup>

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<sup>27</sup>For an ostensibly Marxist statement of these differentiation effects that fails to note the specific agencies responsible for this 'social' division of labour, see T. Bottomore, "Structure and History," p. 163, in P. M. Blau (ed.), Approaches to the Study of Social Structure (1975), pp. 159-171.

The effect of this life cycle stage specific employment on women was firstly to cut them off from any career path within the firms, with the same consequence for their labourer fathers. Secondly, it created an institutionalized discontinuity in the life course of women by enforcing full time 'housewifery,' and thereby created a potential source of division of interest amongst women between their concerns as workers in their unmarried youth, and their needs as 'housewives' in their older years.<sup>28</sup> Most importantly, women did not benefit consistently from their exclusion from the work force when they had dependent children. This can be clearly seen, in that cases where a woman had no man able to work the Cowan managerial declaration specifically stated that such women were themselves expected to work.<sup>29</sup>

Thus, as a result of the high rates of mortality in the nineteenth century (and possibly as a result of desertion too), there were large numbers of working <sup>female</sup> heads of household in the Cowan paper mill (28 percent of all heads employed - see table 6.3). It seems that this high a proportion of female heads of household must have resulted from a selective migration of such women into Penicuik, with the result that the policy of paternalism and its enforced housewifery at Cowans did not exclude older women from continuing experience of employment.

Thus it was that widowhood provoked sympathy but not finance. The following example was considered typical:

'There were no doles and no pensions. There were times when the breadwinner was taken, and the widow had to set to and work for her bairns and keep the little home

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<sup>28</sup>See Oakley, Housewife.

<sup>29</sup>See letter of Cowan's manager quoted in chapter 5, p. 111.

together, working hard at the loom, she would rush home to make a meal for the bairns, and slave to the latest hour at night so that 'her yins' would be respectable-looking . . . '30

The policy of exclusion of married women from paid work was therefore done only insofar as the direct economic costs could be borne by their male worker husbands; the policy was not carried out consistently for all women raising children. (Perhaps this was since such a policy would have involved an increase in the poor relief tax which fell on property holders, who were the wealthier members of the community and not, as we have seen, usually factory workers.)

It has been pointed out that studies of the family have not used sufficiently accurate occupational distinctions in their analyses,<sup>31</sup> and as a result, have underemphasized the extent to which different occupations and work experiences produced different family economies and different strategies of adaption to the constraints imposed by employment.<sup>32</sup> On the other hand, a similar shortcoming has existed in studies of the work process in which the divisions created within the place of work are presumed to be transmitted generally into social life. As a result, the economic transformations made by the families of the workers as they affect inequality in the local community, within families and over the whole of life cycle,

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<sup>30</sup>J. A. Anderson, The Cleikum: Being Interesting Reminiscences of Old Innerleithen (1933), p. 41.

<sup>31</sup>For example by F. Furstenberg cited in R. M. Kanter, Work and Family in the United States: A Critical Review and Agenda for Research and Policy (1977), p. 25.

<sup>32</sup>Family structure tends to be undifferentiated occupationally in Anderson, Family Structure.

are all ignored.<sup>33</sup>

This chapter has attempted to show that a knowledge of both work and family life are essential to an adequate understanding of the effects of the redivision of labour during mechanization. Only with a knowledge of both was it possible to perceive the relationship between the non-promotional jobs of women and labourers - which were linked by kinship. And only by having accurate information on the income and occupation of the head of household was it possible to identify two contrasting principles determining family standard of living: namely, that related to the income level of the head, and that related to the excess of earners over dependents in the household.

The two different types of family economy found in this study do not fit well with the typology proposed by Young and Willmott. In the first place, the two types of family income determination appeared at the same time, and not as two successive 'waves' in which one type replaced another.<sup>34</sup> Secondly, the family type that corresponded to 'stage one' with multiple earners was in fact more characteristically new to the occupational structure (since labourers didn't exist before in these firms) than was the pattern associated with high income which Young and Willmott call 'stage two.' On the contrary, it is more accurate to consider the two types of family economy as concurrent and to agree with Samuel that the features of low paid work and sweated female labour were

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<sup>33</sup>This kind of argument is suggested by H. Braverman, Labour and Monopoly Capital: The Degradation of Work in the Twentieth Century (1974); The Brighton Labour Process Group are aware of this limitation but specifically make no attempt to analyse beyond the direct production process, "The Capitalist Labour Process," in Capital and Class, no. 1 (1977), p. 24.

<sup>34</sup>Young and Willmott, Symmetrical Family, p. 29.

just as much features of industrial capitalism as were potential aristocracies of labour.<sup>35</sup> We should therefore expect to find the type of family economy that corresponded to each, continuing to operate simultaneously.

Finally, no assessment of the costs and benefits of industrial mechanization can be complete without considering the effects on families in the redistribution of work inside and outside the home, by sex, and over the full family life cycle. In particular, the new method of externalizing from the firm the costs of supporting families over their full life cycle, is important in understanding all firms which employ large proportions of age and sex specific labour.

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<sup>35</sup>R. Samuel, "Workshop of the World: Steam Power and Hand Technology in Mid-Victorian Britain," in History Workshop no. 1 (1977).

### PART 3: CONCLUSION

#### CHAPTER 7: THE FUTURE OF THE DIVISION OF LABOUR

This study began with the aim of investigating the concept of 'industrial society,' by looking at its origins in the mechanizations of factory production in two firms in the early and mid-nineteenth century Scotland. It has been suggested that the sphere of production is important for a number of reasons and that, in particular, the relations that existed in the work process gave industry its distinctive characteristics.

In the first place, this research has proposed that the major differentials in wages, such as those between artisans and labourers, and those between men, women and youths, were all more explicable in terms of the power relations of the 'skilled' craftsmen on the one hand, and in terms of traditional status in consumption needs of women and youths on the other, rather than by purely economic theories of wage levels. It has been argued here that the deeply understood cultural distinctions, which were used to identify the major divisions in the population by age and sex, were the basis upon which differential reward for work took place.

However, in contradistinction to certain functional theories of stratification which see ranking as the relatively unambiguous outcome of a general 'value system,' it is argued in this research that the values involved were disputed. This was nowhere more evident than in the case of the claim of artisan craftsmen that 'skill' should be rewarded. Such a value should perhaps be seen as a summary statement of the importance of the group of workers involved in the labour process. A similar basis underlies



the claim of supervisors that the exercise of authority should be highly rewarded, and the claim of clerical workers that 'mental' work should receive higher pay.

A second major area of importance for the work process was seen in the fact that it was the site of the conflict over the division of labour. Labour and management were seen as the main agents in the decision making process that resulted in the redivision of labour. Labour opposed the introduction of machines into the firms studied, but was in both cases defeated and labour's opposition failed. Machines were introduced and the work necessary was re-divided and re-allocated, sometimes independently of machinery and sometimes with machinery acting as an excuse for the disruption of established working arrangements. What management gained was 'real control' over the production process, as distinct from the merely 'formal control' of legal ownership of the product, which was the situation in artisan production.

Despite theories that labour was either unaffected or improved its position during industrialization, this research identifies a number of areas in which labour became worse off. Firstly, the careers of the artisans affected by mechanization were disrupted by the abolition of skilled artisan jobs. As a result, such artisans were forced to take pay cuts when they transferred to new jobs inside the paper firm, and the woollen weavers were forced into increasing economic marginality and eventually technological unemployment, in a significant number of cases.

Labour losses were not confined to the generation directly affected by mechanization. The pay and conditions of work were permanently affected for the worse in many cases, as a result of

the redivision of labour carried out by management. In general this process may be described as 'de-skilling,' and it consists of the breaking down of 'skilled' artisan jobs into their unskilled parts and giving these to labourers, and giving their skilled parts to a 'hyper-skilled' foreman or section head. Not only were wage differentials reduced in many cases but there was also speed-up and new systems of work discipline including time-keeping and fines.

However, management did not only reduce labour to lower economic levels as part of an exercise in cutting costs. On the contrary, many new expenses were incurred as part of the other main aspect of the redivision of labour, namely, the political division of labour in which the tendency to homogenization was reversed and new differences in work and reward were created. Chief amongst these new types of labour were the new clerical jobs, those of supervisors, the 'semi-skilled' machine minders and the low paid labourers, while the expansion of women workers in number had the potential of dividing male from female in the workplace.

Perhaps the biggest loss to workers as a result of the redivision of labour was the new mode of utilization of labour, specifically during certain stages of the life cycle. As a result, career ladders inside the firm were truncated and families were not supported by the firms during their poorest stages of the family life cycle. More research is necessary on occupational differences in family patterns of adaptation to differential employment opportunities. In particular it would be interesting to know more of the employment taken by labourer families during the whole of their family life cycle and the strategies which they adopted to cope with poverty.

One legacy of the industrialization process was the asymmetrical family in which the married women did not take paid employment. Such a change has been argued to have divided the working class in a way which, if not altogether new, was more profound. Thus Young and Willmott have claimed that working class men had a higher standard of living because income became more unequally distributed within families, as a result of the creation of the full time housewife role for married women.<sup>1</sup> It may be noted on the other hand that Jones gives evidence from London that there was an increase in family financial power by women during the second half of the nineteenth century.<sup>2</sup> What is clear from this research is that the decision to create the asymmetrical family was taken by management as part of their policy of paternalism, and that it was done only when working men could carry the economic cost of non-participation by their wives; women with dependent children were not excluded from the labour force when they would have become a cost to the richer members of the community, as was potentially the case with widows.

In general, there are a number of different aspects of the costs of labour over the full family life cycle and over social space, that would add revealing additional information to this study. In one view, the role of the state in providing transfer payments on the basis of need, such as old age pensions, benefits to widows and family allowances, can all be seen as the restoration

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<sup>1</sup>M. D. Young and P. Willmott, The Symmetrical Family (1973) pp. 76-84.

<sup>2</sup>G. S. Jones, "Working-Class Culture and Working-Class Politics in London, 1870-1900; Notes on the Remaking of a Working Class," in Journal of Social History, vol. 7, no. 4 (1974), pp. 460-508, esp. p. 486.

of the symmetrical family form in which there were no dependents and each family member was economically self-supporting. The role of the state is, in this view, not an outside intervention, but a necessary restoration of the relationship between income and family need size, which was severed by industrialization.<sup>3</sup>

A second area in which local costs of family reproduction are considered could usefully focus on the local skews in the population employed in a particular industry. This study has shown the surplus of females and the skew in the numbers of dependent children by occupation. It has argued that the result was extra high local living standards, but that lower corresponding living standards must have existed elsewhere where these families lived in their poorer life cycle stages. Some suggestions that this phenomenon was not unique to the two factory villages studied, come from the anthracite region of Pennsylvania which had a surplus of males because there was more employment for men than women.<sup>4</sup> The search for industries that were symbiotically related to each other in terms of the supply of labour through families, would be an interesting future research project.

A third area in which further research is needed is in the study of managerial control over areas outside the firm. In this work the gaining of 'real control' over the work process has been seen as one of the main changes taking place during the period of mechanization, and its importance as a loss of function for labour

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<sup>3</sup>See here M. Anderson, "Family, Household and the Industrial Revolution," in M. Anderson (ed.), Sociology of the Family (1971), esp. p. 93.

<sup>4</sup>M. R. Haines, "Fertility, Marriage and Occupation in the Pennsylvania Anthracite Region, 1850-1880," in Journal of Family History (Spring 1977).

has been stressed. However, this is but one side of the picture, for, as theory tells us, the process of proletarianization is also predicated upon a loss of means of subsistence, as well as loss of control over the means of production. There is therefore another story to be told of the gaining of control by capitalist management of the markets in which products were sold. We might expect that in this sphere there were conflicts as artisans and consumers resisted loss of control over the quality and price of goods. To some extent Thompson has already done some of this work in his studies of popular grain price fixing.<sup>5</sup> But if this work were generalized, it might be found to apply to all kinds of products throughout the nineteenth century and to relate to artisan complaints about loss of quality.

The study of the effects of labour's losses resulting from the redivision of labour during mechanization, is not complete until we have examined the continuing legacy of the changes introduced at this period. Two of the most important are the sub-division of tasks according to the Babbage Principle, and the exclusion of women from the work force for much of their lives. It is interesting that both these developments have recently undergone publicized attempts at their reversal or abolition; in the first case, 'job enrichment' schemes have attempted to recombine work tasks, and secondly, legislation has attempted to prevent job discrimination on the grounds of sex.

Subsequent changes in the development of the division of labour after the period of this study have in many ways continued

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<sup>5</sup>E. P. Thompson, "The Moral Economy of the English Crowd," Past and Present (1971).

the process of redivision. However, the first mechanizations of many industries took place well into the twentieth century, for example, the coal industry was being mechanized at the time of nationalization in the late 1940's.<sup>6</sup> Office mechanization and computerization are still taking place and have a long way yet to go. Later changes in industry include mass production assembly lines, automation and numerical control, which have been considered by Blauner and by Braverman.<sup>7</sup> With the possible exception of continuous flow systems of production, all these changes have been considered as further differentiating and fragmenting labour.

However, some recent developments have tended to make partial reversals of this trend towards differentiation, which some commentators had previously described as 'universal.'<sup>8</sup> The most publicized recent change has been the attempt to 'beat the blue-collar blues'<sup>9</sup> by recombining the work tasks so as to make fewer distinct occupations, and having teams of workers rotate jobs or allocate jobs according to their own group preferences. Such schemes have been called 'job enrichment' and have been interestingly reviewed by Pignon and Querzola in the light of the managerial

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<sup>6</sup>See, for example, the study done at this period by E. L. Trist and K. W. Bamforth, "Some Social and Psychological Consequences of the Longwall Method of Coal-Getting," in Human Relations vol. IV, no. 1 (1951).

<sup>7</sup>R. Blauner, Alienation and Freedom: The Factory Worker and His Industry (1964); H. Braverman, Labour and Monopoly Capital: The Degradation of Work in the Twentieth Century (1974).

<sup>8</sup>For example, Eisenstadt following Parsons says that 'the division of labour is an evolutionary universal of the human species.' S. N. Eisenstadt, Social Differentiation and Stratification (1971), p. 13 (emphasis in original).

<sup>9</sup>M. Kranzberg and J. Gies, By the Sweat of Thy Brow: Work in the Western World (1975).



theories behind them and their practical operation.<sup>10</sup> The fact that such schemes are not confined to production lines or to particular technologies, but also to artisanal work (Pignon and Querzola give the example of telephone installation) and to office clerical work, suggests that the recombination of labour is not related to technology. On the contrary, it suggests that such schemes have more to do with the need of management to change the method of control over labour, by using market control through profitability rather than the personal control of direct supervision. Pignon and Querzola conclude that such developments do not signal a general reversal of the trend of the division of labour, but only a limited movement that has severe economic structural limitations.

However, the existence of job enrichment schemes demonstrates that the trend towards increased sub-division of tasks is reversible, and it raises anew the question of generalizing such changes. Unlike Durkheim and many others since who have considered the division of labour as evolving only in the direction of greater differentiation, Marx always treated the division of labour as a source of alienation. His rare descriptions of non-alienated life explicitly abolish the division of labour into distinct occupations.<sup>11</sup> In this view, all the distinctions between manual and non-manual, skilled and unskilled, professional and non-professional, employed and non-employed, between responsibility and decision making on the one hand and obedience and discipline on the other, are all barriers to the recovery of alienated human being.

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<sup>10</sup>D. Pignon and J. Querzola, "Dictatorship and Democracy in Production," in A. Gorz (ed.), The Division of Labour, pp. 63-101.

<sup>11</sup>K. Marx, The German Ideology (1845-46), quoted in D. McLellan (ed.) The Thought of Karl Marx (1971), p. 217; and see chapter 4, p. 84.



In this context it is interesting to note that, for a period at least, a Marxist inspired government in China tried to alter some important aspects of the division of labour, in particular the role of the technical experts in relation to direct production workers.<sup>12</sup> While there has been no major and sustained effort to change the division of labour and develop non-hierarchical organizations of production, the Chinese case and the job enrichment experiments show that there is considerable scope for exploring the distinction between work tasks and occupations. That is, while the work tasks may be specialized, there remains the possibility of recombination of tasks and the rotation of jobs.

Such changes would, of course, conflict with the criteria of differential reward that we have seen underlie present occupational divisions, and would thus involve a major cultural and ideological upheaval in a society in which they occurred. In this way the study of the place of the division of labour in the historical development of societies brings us back to the original question of this research - the nature of rewards for occupations. It may be suggested from this research that the ideologies of rewardability are inseparable in practice from many, perhaps most, jobs, since these occupations were actually created with such reward dimensions in mind, just as the Babbage Principle suggested.<sup>13</sup> Practical attempts to abolish the division of labour, whether by the Owenite socialists in the nineteenth century or by Kibbutz dwellers in twentieth century Israel, continue to be valuable

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<sup>12</sup>See M. Maccio, "Party, Technicians and Working Class in the Chinese Revolution," in Gorz (ed.), Divisions of Labour, pp. 103-122.

<sup>13</sup>See discussion of redivision of labour in chapter five.

objects of research. This is because of what they reveal about the methods by which such ventures succeed in reaching their objectives, and about their failures due to structural limitations imposed upon the recombination of labour.

One of the smaller effects of the 'job enrichment' schemes, although possibly important for labour union acceptance, has been the abolition of the promotional ladder due to the disappearance of the supervisory job of foreman. The question of job ladders is important in the second area of recent change in the division of labour created by the full factory system, namely in the work careers of women. Clearly it will be essential, for women to be placed on the same footing as men, that the jobs taken by women are made part of the firm's promotional job ladders, and that women do not suffer loss of seniority as a result of their life cycle stage specific absences from paid employment.

It may be affirmed that, contrary to the suggestions of Young and Willmott, the abolition of the asymmetrical family will require more than increased labour participation by women. Young and Willmott imply that an increase in domestic tasks by husbands and more say by wives in how the money is spent, have already recreated the symmetrical family.<sup>14</sup> On the other hand, many women's groups have argued that full employment opportunities for women are essential if power relations between men and women are to be equal. But even more, the fully self-supporting family of pre-industrialization was one in which children were not dependents. Such a situation in modern times would imply the need for wages paid to children just as some people have advocated wages paid for

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<sup>14</sup>Young and Willmott, The Symmetrical Family.

housework by women. Only with a change as thorough as this, would the legacy of the division of labour created in industrialization be ended, for the asymmetrical family implied not only changed relations between the conjugal roles of husband and wife, but also changed relations to the newly dependent children.

While this research began with a question originating in the theory of work, namely the nature of occupational reward for new jobs, a conclusion of this study is that many aspects of work cannot be understood without examination of the family background of workers. Indeed in much of this research, occupation and family have been analysed in close interrelation.

In the handicraft period of manufacture, women and children's wages were seen to have been proportional to subsistence needs in the sphere of reproduction. One of the main **results** of the re-division of labour was the substitution of cheap female labour, which was both cheaper and potentially politically divisive of labour in relation to capital because of the family roles of such women. Indeed it was argued that the new female life course was built into the occupational structure of the firms; in the family of origin the non-promotional jobs of both young women and their labourer fathers were seen to be structurally combined, and in the family of procreation the full time housewife role induced out-migration and job change for lower paid husbands, in both cases fitting the non-promotional character of female and labourer jobs. Finally, much of the politically divisive potential of the re-division of labour derived from the exploitation of age and gender divisions in the population that supplied labour. In this latter aspect the significance of family roles for the study of work and

labour process is again revealed.

In the discussion of all these changes taking place, the emphasis has been on the importance of the division of labour as it affects many different areas of social life. Far from seeing the division of labour as inevitable, or the product of necessary differentiation, this study has placed its emphasis on human decision making in creating each part of the redivision of labour. In particular, the actions of industrial managements have been stressed, although the opposition of labour has, at many points, been seen as crucial. It is in such actions that the mechanism of transition from one form of society to another is to be found,<sup>15</sup> and one important object of this research has been to identify the area surrounding the division of labour as an important area of social decision making.

The sociology of this study has been historical, not simply in the sense that its data is not modern, but in the deeper meaning of history, namely that of genesis and of social origins, development and change. In this way it has been attempted to study what has, for a long time, been part of the declared agenda of sociological research but which has too rarely been practiced. Nearly two decades ago C. Wright Mills said, 'All sociology worthy of the name is "historical sociology" ' and, modifying Sweezy's phrase, it could be said that this research has been an attempt to 'write history as the present.'<sup>16</sup>

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<sup>15</sup>See P. Abrams, "The Sense of the Past and the Origins of Sociology," in Past and Present, no. 55 (1972), and discussion above chapter 2, p. 18.

<sup>16</sup>C. W. Mills, The Sociological Imagination (1970), pp. 162-163.

APPENDIX A: SIZES OF POPULATION ANALYSED.

TABLE A.1: NUMBER OF CASES IN MAIN ANALYTICAL POPULATIONS  
( 'SAMPLE' SIZES.)

		<u>Analytical Level</u>		
		Total Workers in Firm	Total Household Heads in Firm	Total Popula- tion De- pendent on Firm
		N	N	N
<u>Wool</u>	<u>After</u> (Walkerburn) 1881	388	89	741
	<u>Before</u> (Galashiels) 1851	82	31	146
<u>Paper</u>	<u>After</u> (Penicuik) 1851	392	122	658
	<u>Before</u> (Penicuik) 1811	120	Not Available*	Not Available*

Notes: \* Census information for this period is not available, see chapter 2.

'Total workers in firm' is the size of the main wage book to census linkage population.

'Total household heads in firm' is the main family income and composition analysis population.

'Total population dependent on firm' is the largest population studied. It was used in the labour participation study described in chapter 6 and contains fractional frequencies. See table 6.1.

## APPENDIX B: DATA-BASE MANAGEMENT

### The Problem

As described in chapter 2, the general strategy of this research was to get a wide knowledge of a small population of industrial workers, and to this end, records from a variety of sources had to be linked together to produce a unified data set for analysis by one of the standard data analysis packages (e.g. SPSS or FAKAD). Many of the constraints that were put on this aspect of the research were imposed by the requirements of these software packages, and lacking the services of an advanced computer programmer<sup>1</sup> there was no way of avoiding the use of these. This is not to say that such packages are not very good for many purposes, simply that they were considerably removed from the requirements of this particular research project. While the specific details of this research may be unique, the kinds of problems encountered and the general type of solution found, are included here, so that other researchers, particularly in historical studies, may benefit from this experience.

### Pre-Coding

The amount of information that was pre-coded, that is presented as numerical summary statistics,<sup>2</sup> was kept to a minimum with the aim of maintaining the maximum flexibility for later analysis. The first major limitation of existing software was encountered at this early stage, namely that all the cases or

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<sup>1</sup>This research was undertaken in three years funded by an S.S.R.C. studentship for the degree of PhD, and cannot be compared, in respect to time or programming resources, with large heavily funded research projects.

<sup>2</sup>See E. Shorter, The Historian and the Computer, (1971) for introduction to these concepts.

people must have the same number of records each. Thus each person must have as many records as the person with the most records in the population under study. Clearly if there are only a handful of these in a large population the vast majority of the cases will have to have blank or dummy records, which has the following disadvantages: a) it is very inefficient and therefore costly to store and use the data set, and b) more seriously, the files to hold all these records may become unmanageably large.<sup>3</sup> For these reasons the three sources with the greatest coverage or widest distribution amongst the population were chosen, namely the census, the wage books and the valuation roll. Information was taken from each of these sources and a separate 'record' (or 'card') was created for each person. Each type of record was given a source-identifying code,<sup>4</sup> i.e. all census records for the same year and place were given the same three digit code, and the information was copied down from the original source documents in the original order onto 80-column coding sheets.<sup>5</sup> The information at this point had a source identifier on the left, twelve numerical coded variables,<sup>6</sup> and a 'string' of alphabetic characters which gave the individuals' surnames and forenames, occupations and other information. Two limitations were imposed here: first, that no record was permitted to be longer than eighty

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<sup>3</sup>More than 2,500 records reach the 'foreground' limits and 5,000 records is the published upper limit (EMAS).

<sup>4</sup>I am grateful to Bob Morris, University of Edinburgh, for this tip and for initial advice which set me off in the right direction.

<sup>5</sup>I would like to thank Lucy Holley for her assistance in this task.

<sup>6</sup>Only the census 'life cycle stage' variable related to the whole family and not to the individual; and of the other precoded variables, only the 'industrial character of place of birth' and 'distance of migration' variables involved much prior research.



columns (although there may be no problem in expanding to the full width of line-printer paper); and secondly, that each record had to have the same number of variables (and although this last condition was less important, it made for ease of programming and for easy visual inspection for records 'out of field').

### Punching

The information on the coding sheets was punched onto 80 column punch cards<sup>7</sup> and these cards were submitted as a batch job to the ICL 4-75 computers of the Edinburgh Multiple Access System (hereafter EMAS). The advantages of a 'third generation'<sup>8</sup> interactive computing system cannot be overstressed when it comes to this kind of work; errors can be quickly spotted and corrected if programs run in foreground, and they can be quickly changed with the 'editor' and re-compiled.<sup>9</sup>

### Sorting Prior to Record Linkage

The machine readable information at this point exists as a series of separate 'files,' one for each original source containing as many records as there are names of people in the original documents. These files are each in turn put into fixed format and the string texts are 'resolved.' (i.e. separated into their component parts), and the whole file is then written out and expanded to a

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<sup>7</sup>I would like to thank the E.R.C.C. Data Preparation Service at Alison House for doing most of this punching.

<sup>8</sup>For a brief description of computing history in relation to record linkage, see H. B. Newcombe, "Record Linking," in American Journal for Human Genetics, 19 (1967), pp. 335-59.

<sup>9</sup>Programs were designed to run in under 2 minutes of C.P.U. time. I would like to thank the Edinburgh Regional Computer Centre's Advisory Service for answering many specific enquiries.

full 132 columns (the width of line-printer paper). Wider than this, major sorting problems appear, and for this reason only the name and occupation of each person (each record) were retained.<sup>10</sup> This program was called TIDY1, which puts the source code on the left, then a string of name information (alphabetic), then a string of occupation information (alphabetic), and then the twelve numerical variables. The three files for each specific time and place, one from each census, valuation roll and wage book, are next merged together and sorted using any standard sort/merge routine.<sup>11</sup> This procedure produces one single long file which, being sorted on the people's names (i.e. starting with the first column of surnames using the whole string as the sorting "key"), and being sorted on the source codes (inside names), brings adjacent all the records of people with the same name.

#### Record Linkage

When at this stage, the information for one time and place is available in a single long listing with all records with the same name adjacent, then the process of record linkage can begin. A note on the method used is given in appendix C. Since a visual and non-automated method was used, no program was written to perform this task. Instead the file was listed on the line printer and linked records for one individual were given an Identifying Code number (hereafter I.D. number) which was unique for each individual.

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<sup>10</sup>The free format alphabetic information in the 'remainder' of the string was blank in most cases and was not considered useful enough to retain.

<sup>11</sup>This project used the SORTFILE routine of Morton Ogilvie, of the University of Edinburgh, which proved flexible and easy to use.

As a device to recover the order of one of the sources, the wage book, these numbers were assigned to the wage book members in order of their appearance in that original listing.<sup>12</sup> The I.D. numbers were either added using the 'editor' if the file was very short, or by creating a file with the I.D. numbers in it, in the correct order and having the program ADID add them sequentially.

#### Creating an All-Numerical File

At this point we have a series of records with I.D. numbers to distinguish all records belonging to the same individual, but they are in an order dependent upon the vagaries of the spelling of the name in the original source.<sup>13</sup> Before unifying the files to bring all records for the same individual together, a further piece of coding was done, namely the coding of 'occupations.' Again flexibility was kept at a maximum by simply using a different three digit code number to identify each substantively different occupation.<sup>14</sup> This was done by sorting on the occupational title string and using the 'editor' to add the code numbers. The alphabetic string could then be removed (using the editor), since an I.D. number has replaced a person's name, and an occupational code name has replaced the job title.

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<sup>12</sup>The use made of this trick will be seen below.

<sup>13</sup>No attempt was made to standardize or code the names, e.g. using 'Soundex' or a similar system, as would have been necessary with an automated method.

<sup>14</sup>No attempt was made to pre-code 'occupation' since much of this research is an attempt to reveal bases of such classifications.

### Creating an Individual-Based File

To link together the records of one individual we must change a file that is still based on separate records, into one that has a standard three records per person (one record for each of the three sources). This is a complex matter since each person does not appear in each source, and in the case of the valuation roll, a person may have more than one record.<sup>15</sup> The file was first sorted on I.D. number to bring all records relating to one person together, and (inside I.D., i.e. as a second sorting key) on the document identifying codes to put these in the same order for each individual.<sup>16</sup> The actual creation of the individual or person-based file was done in three separate steps. Firstly the file was read and the I.D. numbers and document codes were written out into a separate work file in order of their appearance ( program READ1). This work file was then read by the program JUMP1 which put the counted total number of records present for each person against that person's records. A third program (DTA1) writes out the records for each person, putting in a dummy record of zero where a particular individual was not linked to a particular source. All 'surplus' (i.e. more than one per person) valuation roll records were written out to a separate listing file.<sup>17</sup> The result is a file that has

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<sup>15</sup>Another limitation of currently available packages is that multiple records had to be discarded because like certain sources, they referred to such a small proportion of the cases in the population. In the case of valued property, the largest valued property was selected, and information relating to other properties was added in later in editor mode.

<sup>16</sup>Note that all sorting referred to, used the above mentioned SORTFILE routines.

<sup>17</sup>Concentration of property ownership is discussed in chapter 6.

three records for each person who appears in the original source documents to be linked.<sup>18</sup>

### The Problem of 'Levels'

Having linked the records together for each individual, it was necessary to recover the order of the original source documents so that extra information (variables) at a higher level (i.e. of a contextual kind) could be added. In the case of the census, this involved information relating to the household as a whole (its head and size etc.); and in the case of the wage books this meant adding information on the collective attributes of the workplace (occupations which people held, department size, etc.)<sup>19</sup>

### Adding Household Information

The household information from the census could only be collected by first returning the individuals in the linked file to their household (census) order. This was done by removing the relevant sorting keys (enumeration district, schedule number, relation to head and age) from the individual's census record and putting a copy of these on the left of each of the three records for each person, using the program SORT3. The file was then sorted on these keys in the order given above, ending with the record number key,

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<sup>18</sup>This inevitably produces an inefficiently large file since it contains much 'blank' information simply in order to keep the same number of records per person.

<sup>19</sup>This kind of information can only be added as a single 'code' at one level until packages with a hierarchical or 'tree' file handling capacity become available. MIDAS and OSIRIS (University of Michigan) have some of these aggregation and data-structuring capabilities (I believe), but were not available. SPSS is planned to have these capacities in the future. Until this happens the sophisticated analysis of group relationships, for example occupational groups or family groups, will not be possible.

thus putting each person's records in the same order. We then had a file with the individuals in their household (i.e. census) order, those individuals not linked to the census being removed to the top of the file. The sorting keys were then removed with the editor, and a program (HOUSESD) read the resulting file and wrote out to a new file, information relating to the head, household size, needs and other information. This new information at the level of the household or family was added back into the individual level file, condensing the information onto a total of three records ('cards') per case ('person'); (program ADHED). The result is a file at the individual level which has information of an all numerical kind relating to the individual from three sources, and these files are the basis from which the analysis begins.<sup>20</sup>

#### Adding Workplace Information

Using information on individuals and their families produced above, the firm and the work situation were examined. In order to get the individuals into the workplace order (wage-book order), the head/individual file was simply sorted on the individuals' I.D. number<sup>21</sup> and on the record ('card') number, to put each individual's three records into the correct order. Once the non-wage book individuals were removed from the file, detailed study of the firm could begin, since it was then possible to find the age and social characteristics of the workers through the link to the census. Extra wage book information (e.g. length of service in the firm) was added from a newly created sequential file by the program

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<sup>20</sup>These have been called the 'head/individual' files.

<sup>21</sup>See footnote 12, page 177.



ADWB, and the result was the final workplace analysis file with four records ('cards') per person.

### Analysis at the Highest Level

Finally, a selection of the most relevant information pertaining to the family or household as a whole was removed from the combined head/individual files, for analysis at the higher level of the household (rather than the individual),<sup>22</sup> using the program HOUSEX. This was found to be the best strategy for analysis since a small file of salient information at the higher level is very easily analysable with an interactive analysis package such as FAKAD.<sup>23</sup>

The data-base management outlined above was concluded after the writing and running of ten programs, plus five sorts, done on each of four 'time and place locales.'<sup>24</sup> This task took from August 1975 to May 1976, or ten months from original documents to analysable data files. While the aims of this data-base manipulation were specific to this, in some ways unusual, research project, nevertheless the problems encountered are of more general significance to researchers in the historical and social sciences. This discussion has been included in the hope that the solutions found will help future researchers, whether the specific methods given here are used or others are found.

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<sup>22</sup>This was found necessary because of the difficulty of 'aggregating,' for example individuals into households or workers into occupations.

<sup>23</sup>Nearly all the analysis in this project used FAKAD, written by K. I. MacDonald of the University of Essex. An alternative will be interactive SPSS when this program is completed. The greatest need is for an interactive data analysis program that has good aggregation and data-structuring capabilities.

<sup>24</sup>See figure 2.1.



### APPENDIX C: RECORD LINKAGE

The main record linkage in this study is that of the firm's wage books synchronically linked to the census, and the methods noted in this appendix will refer to this, the other linkages following the same general rules. Firstly, some general conditions under which the linkage took place will be identified; secondly, the rules used for matching records will be discussed; and finally, a table will give details of record linkage success rates achieved.

In the first place, the high degree of reliability of the sources, the population listings used, should be noted. Not only are the British censuses of 1851 and after, generally considered to be of high quality, but the wage books of the firms studied appear to have been very consistently compiled, with of course much accurate local knowledge. Secondly, the chances of accurate linkage are greatly increased by the fact that the records to be linked were very close together in time. In all cases the wage book entries closest to census night were taken as the basis for linkage, and in this way changes in the population through death and migration were minimized.<sup>1</sup> Thirdly, as noted in chapter 2, the communities in which the record linkage was to take place were small, having a total population of under two thousand people.<sup>2</sup> Taken together these reasons represent the main basis for confidence in

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<sup>1</sup>The longest time gaps in the sources to be linked, existed in the Penicuik study of 1851, where the wage book comes from September (due to a gap in the wage book series) while the census was in April. Furthermore, in this data set, the first property valuation roll from 1855-6 was added in - see chapter 6.

<sup>2</sup>The only exception was Galashiels in 1851, which had a population of about ten thousand people, and the success rates in linkage are lower in this case for this reason.

the results of the record linkage procedure, and without them we could have expected much lower linkage rates and much more room for doubt about the representativeness of the linked individuals.

The record matching procedure used the following main keys: individual's name (forename and family name, plus initials if any), sex (implicit in name), and occupation; further, in the census, age and place of residence were relevant criteria. In fact, given the limiting conditions outlined above, a large proportion of the records were relatively unambiguously linked, such records being the only ones with the correct name and occupation. Next easiest to link were those cases where a common spelling change had taken place, such as Scottish forms of Christian names (Ellen for Helen, Jean for Jane), and when other difficulties such as legibility had been resolved, many more linkages were produced. Finally, of those records with the correct name but incorrect occupation, there were two main types which were found to be truly linkable: 'scholars' in the census who had newly entered the work force, and married women who often appeared in the census as '(Occupation's) Wife'. The latter linkage was made when no suitable candidate could be found in the enumeration division closest to the mill. If there was no candidate with the correct name, of employable age (no child was found employed under age ten), then all individuals with the same name were taken from the surrounding enumeration divisions and added to the pool of potential linkage candidates.<sup>3</sup> These last

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<sup>3</sup>This method of collection accounts for the non-geographically specific character of the purposive sample known in this study as 'all census households collected.' This sample is therefore in part locality based, being all the households in the village in which the mill was located, and in part a collection of households which contained individuals of the correct name needed for linkage to the wage books. For total size of samples see appendix A.

linkages probably have a lower reliability than those made first and most easily.

In operational terms, the linkages were made by sorting all the pooled records by computer and listing the combined file. A unique identity number for each individual was assigned by hand. In fact a semi-automated procedure could have made at least some of these linkages, but the small size of the files permitted visual addition of the I.D. numbers.<sup>4</sup> See appendix B for details of file handling.

The success rates in record linkage and the relevant 'sample' sizes are given in table C.1. The average overall linkage rate from wage books to census was 94 percent. This very high success rate should be contrasted with that achieved by diachronic record linkage, for example between decennial censuses, which may have a crude linkage rate (not allowing for deaths) of under 20 percent.

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<sup>4</sup>For the theory and practice of record linkage by machine see I. Winchester, "The Linkage of Historical Records by Man and Computer: Techniques and Problems," in The Journal of Interdisciplinary History, vol. 1, no. 1 (1970); and I. Winchester, "A Brief Survey of the Algorithmic, Mathematical and Philosophical Literature Relevant to Historical Record Linkage," in E.A. Wrigley (ed.), Identifying People in the Past (1973); also J. M. Kennedy, "File Structure for the Automatic Manipulation of Linked Records," in E. D. Acheson (ed.), Record Linkage in Medicine (1967); and H. B. Newcombe, "The Design of Efficient Systems for Linking Records into Individual and Family Histories," in American Journal of Human Genetics (1967); for details of an empirical study in a historical context see T. Hershberg, A. Burstein, and R. Dockhorn, "Record Linkage," pp. 137-163 in Historical Methods Newsletter, special issue on the Philadelphia Social History Project, vol. 9, nos. 2 and 3 (1976).

TABLE C.1: SUCCESS RATES IN LINKAGE OF INDIVIDUALS FROM WAGE BOOK TO CENSUS

	<u>Wool</u>			<u>Paper</u>	
	<u>After</u>	<u>During*</u>	<u>Before</u>	<u>After</u>	<u>Before</u>
	n	n	n	n	n
Total Wage Book Individuals	388	126	82	392	120
Total Linked to Census	365	124	70	367	Not Available
Percentage Linked to Census	94%	98%	85%	94%	Not Available

Note: \* A pilot study was made of Walkernburn in 1861, when the population concerned was small, and programs and methods were developed in this small study. This time period is not used in the text.

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